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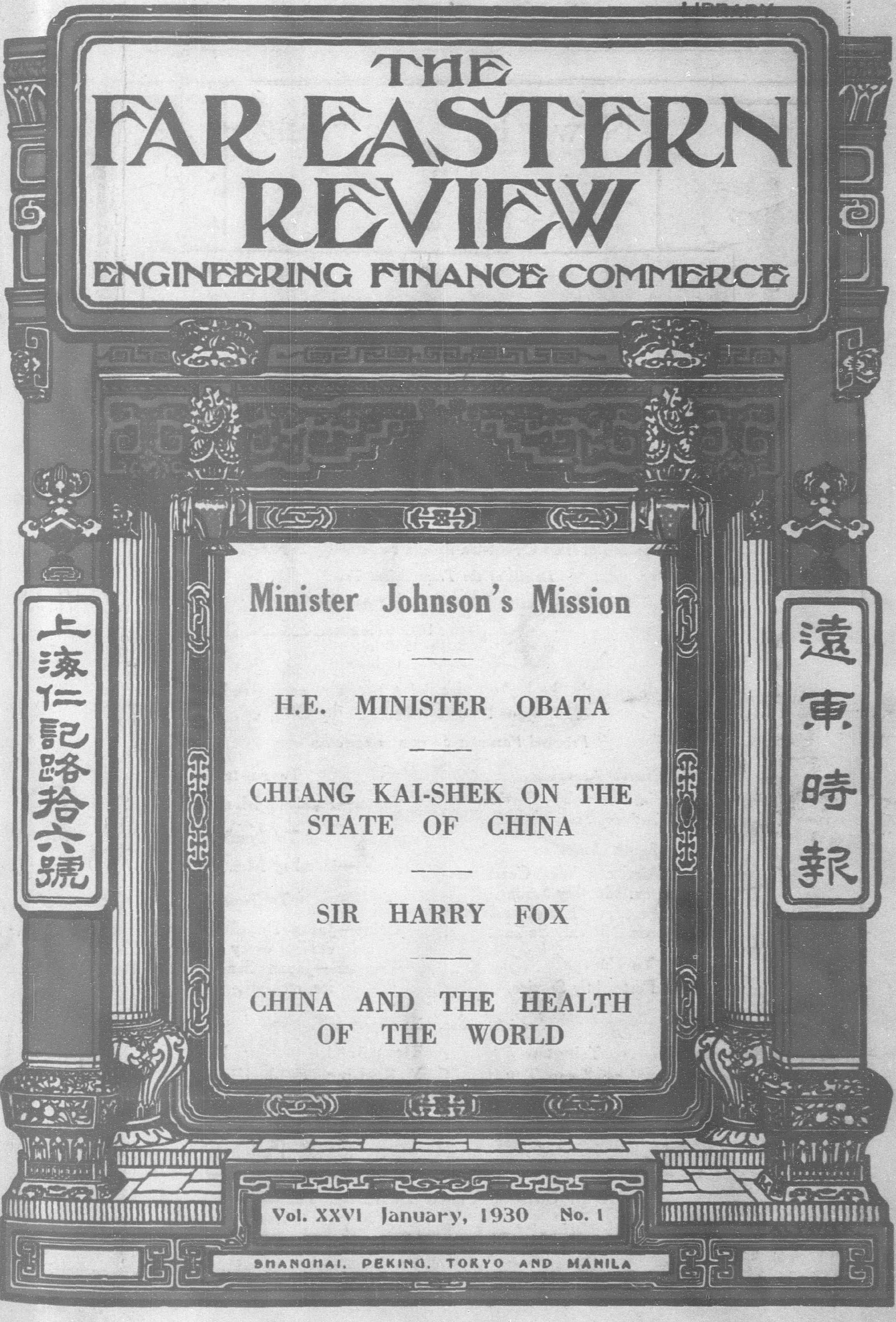

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ENGINEERING FINANCE COMMERCE

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Minister Johnson's Mission

H.E. MINISTER OBATA

CHIANG KAI-SHEK ON THE STATE OF CHINA

SIR HARRY FOX

CHINA AND THE HEALTH OF THE WORLD

Vol. XXVI January, 1930 No. 1

SHANGHAI, PEKING, TOKYO AND MANILA

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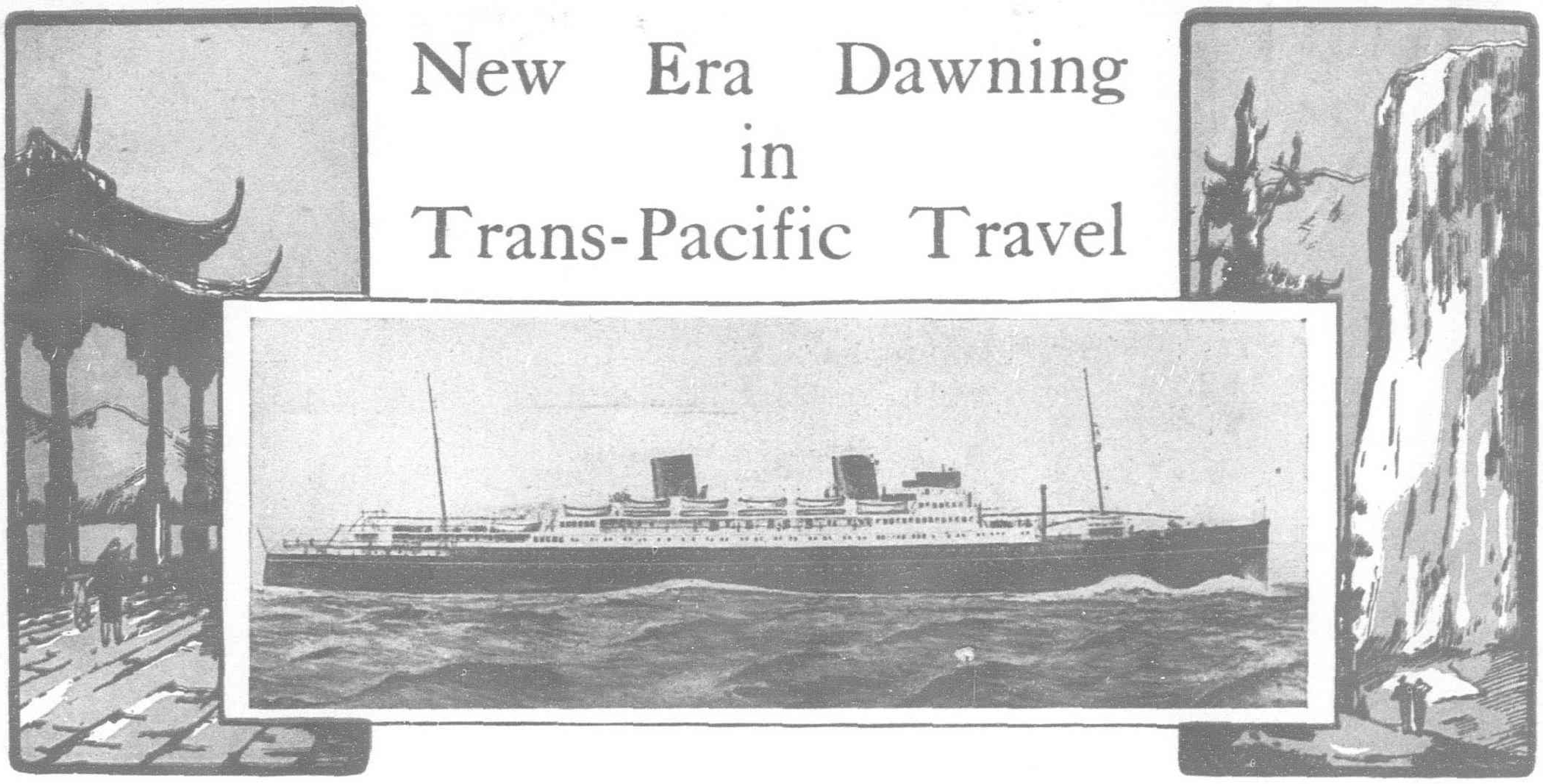

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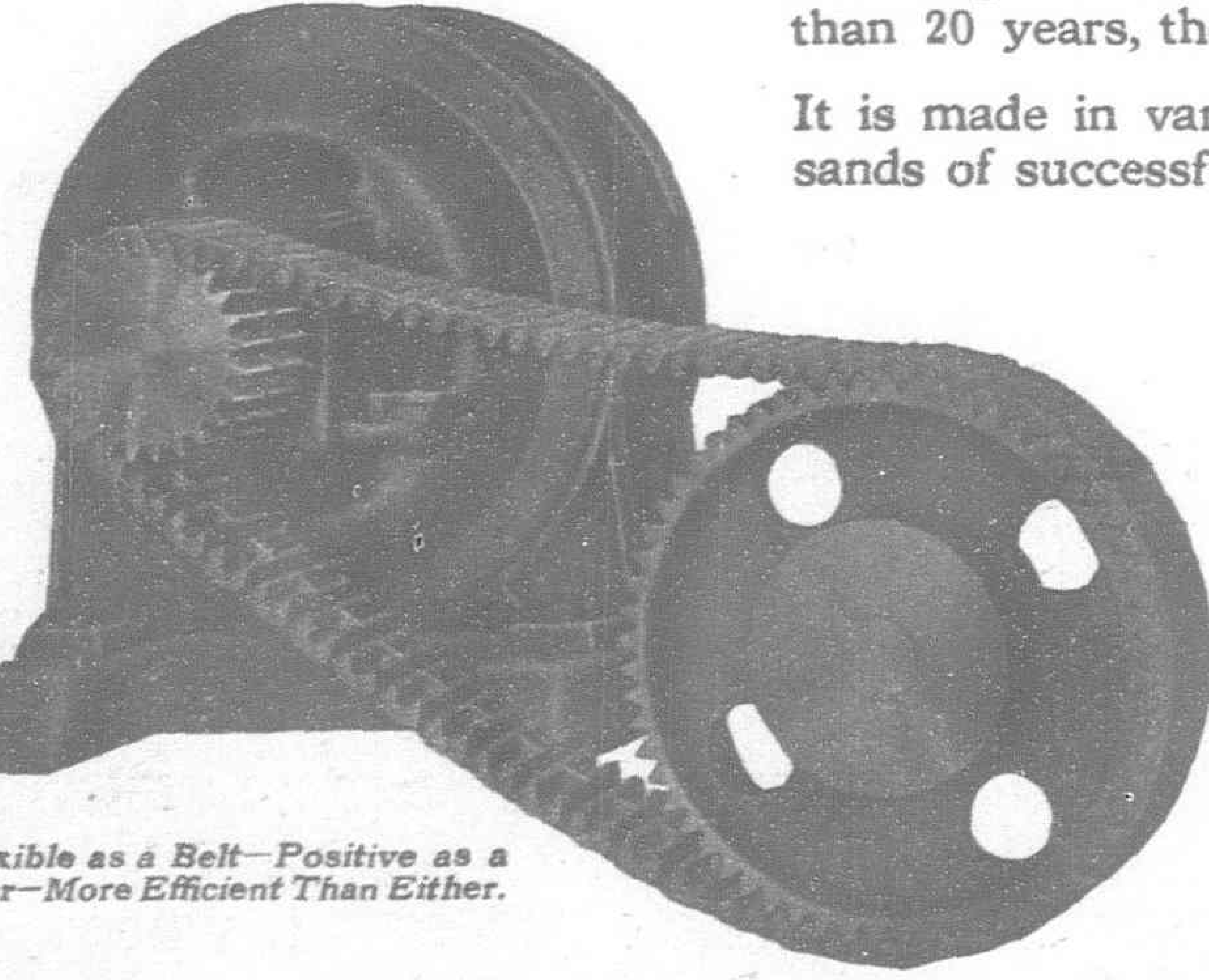

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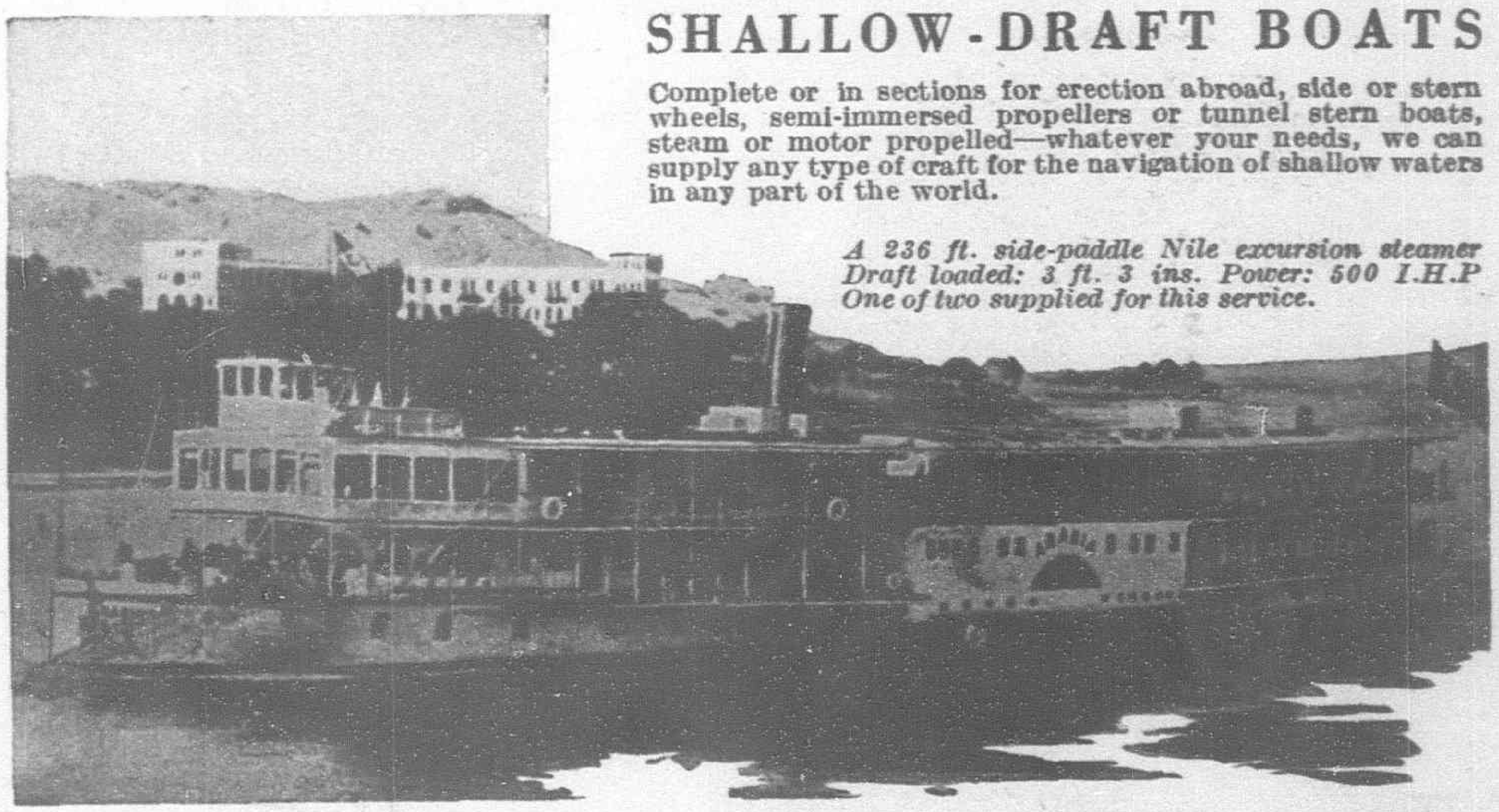

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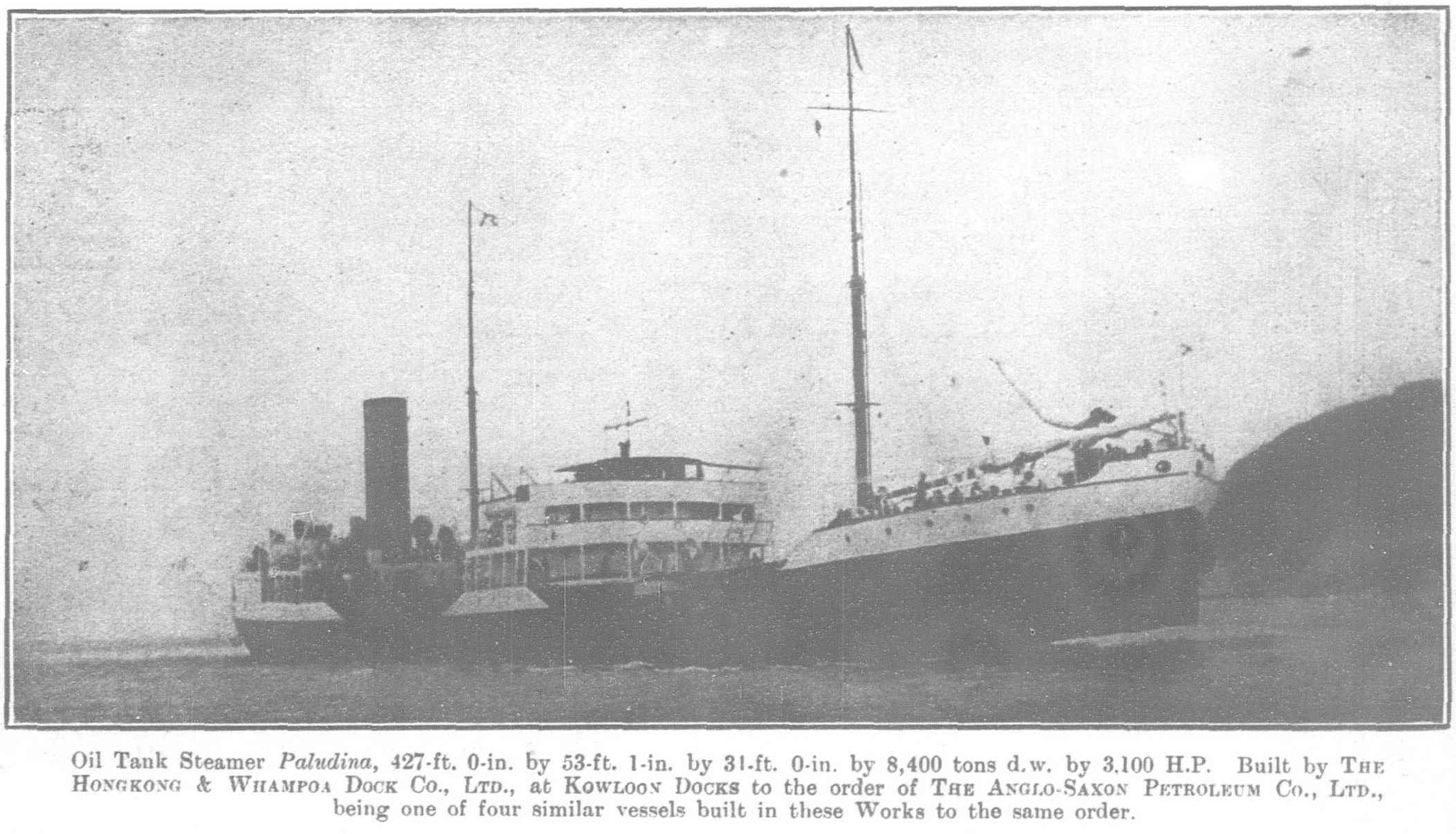

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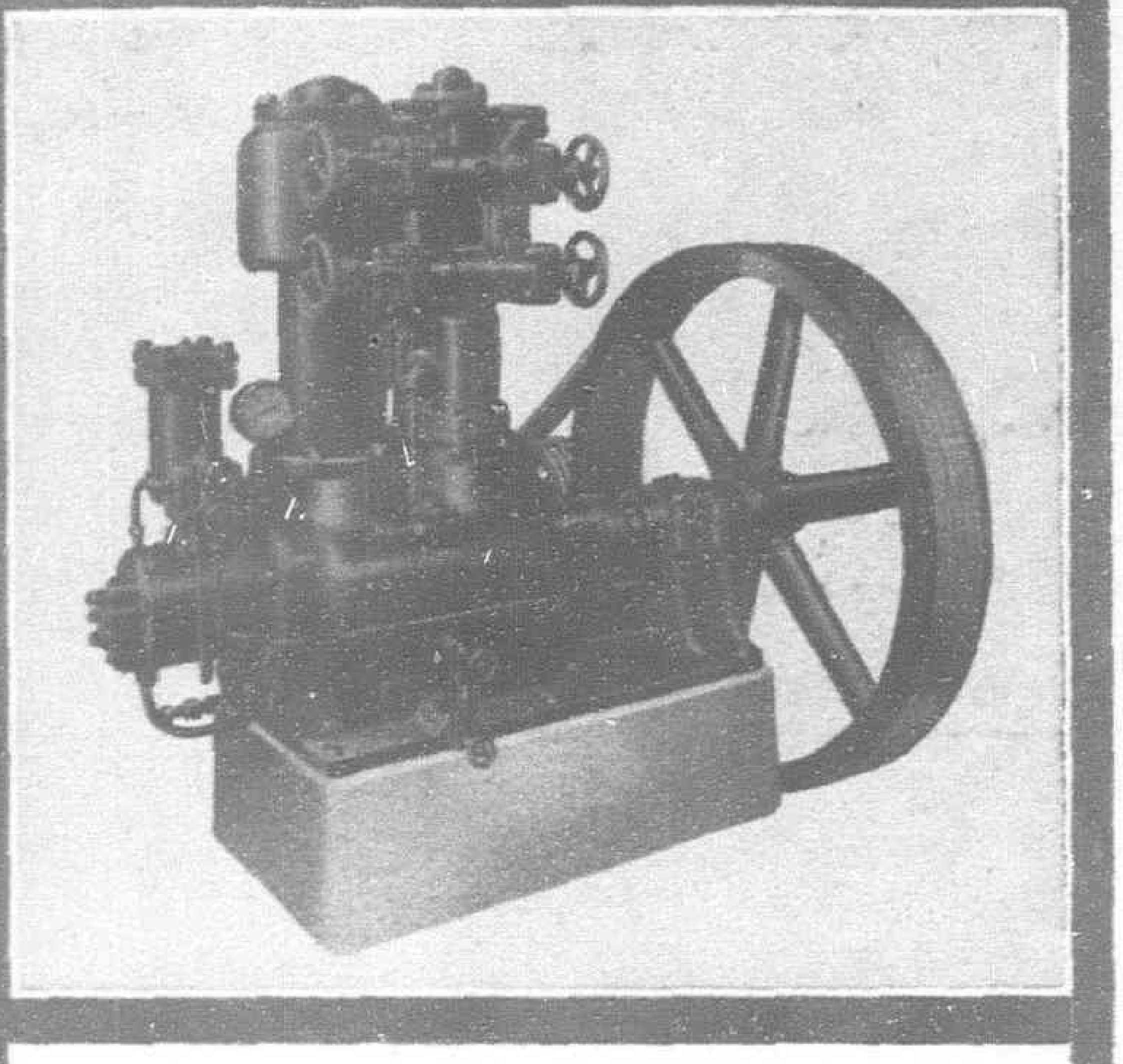

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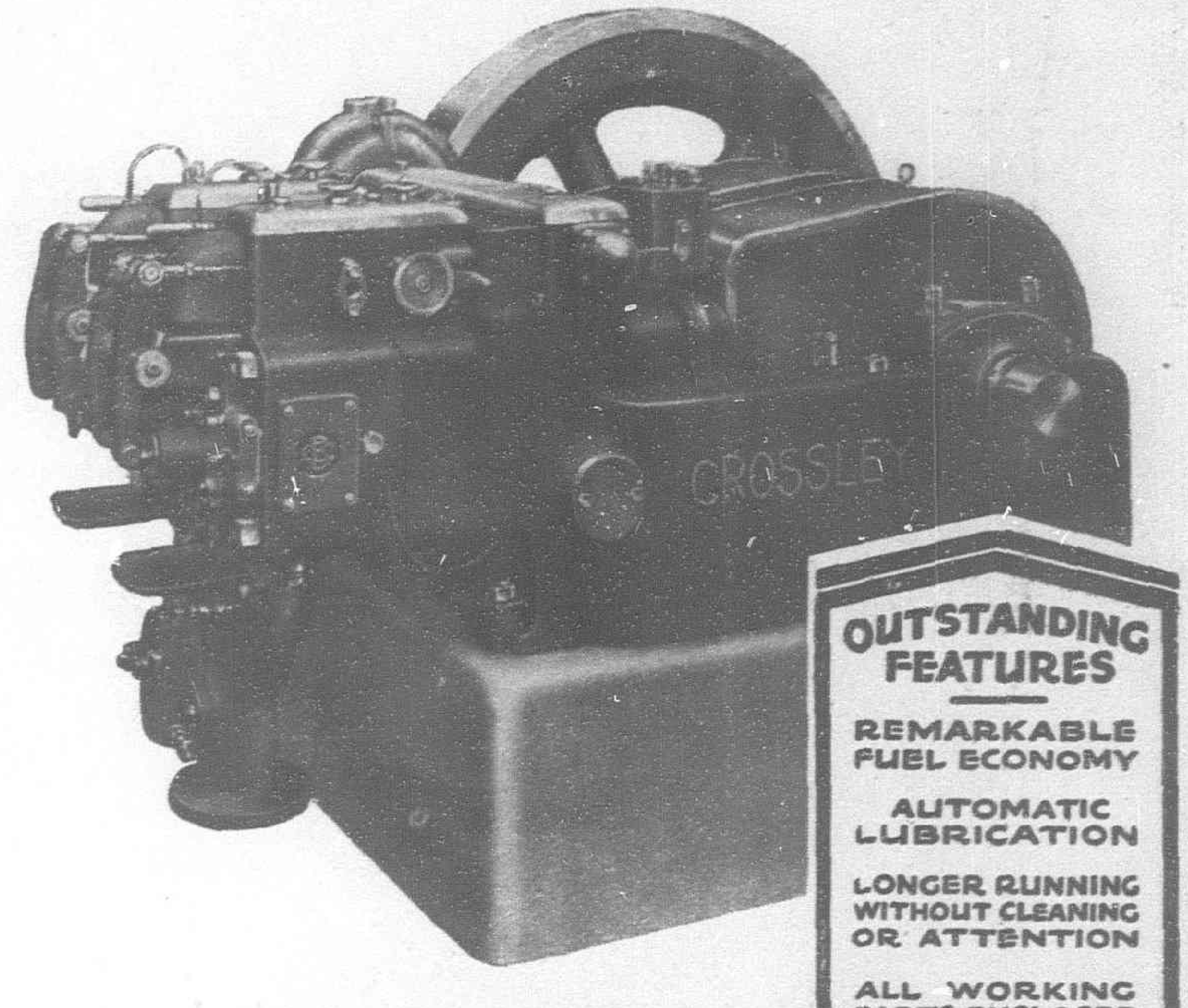

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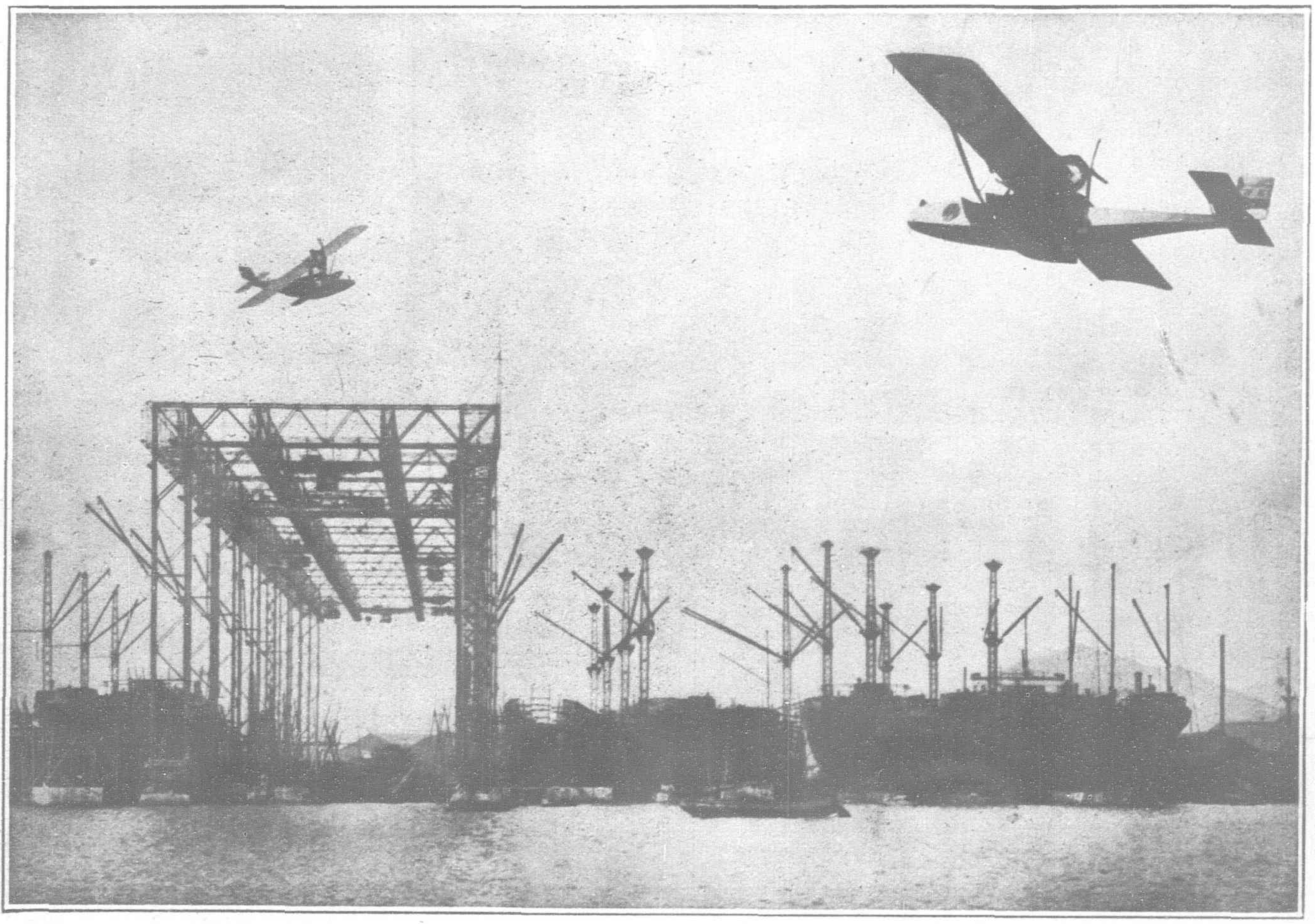

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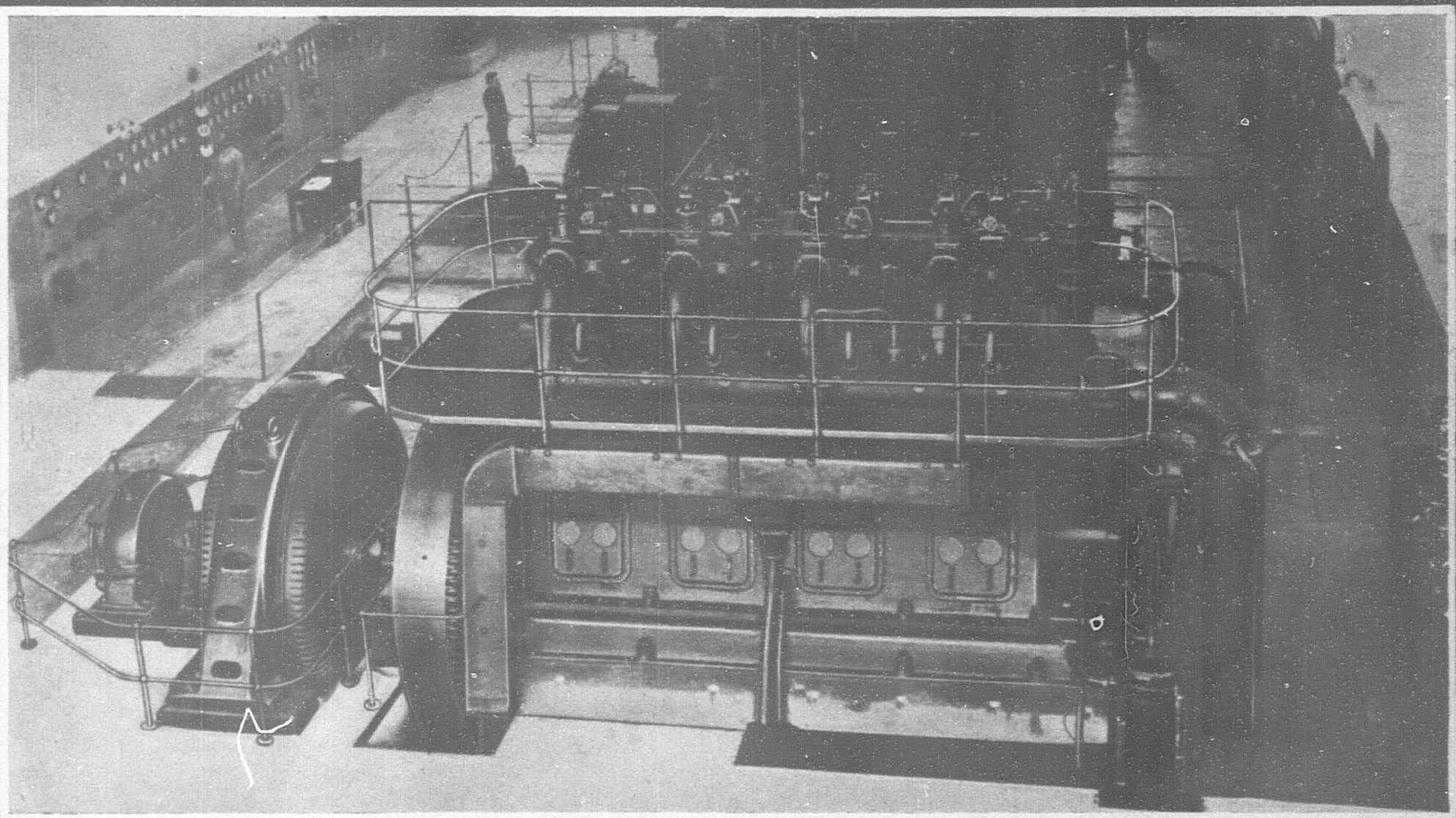

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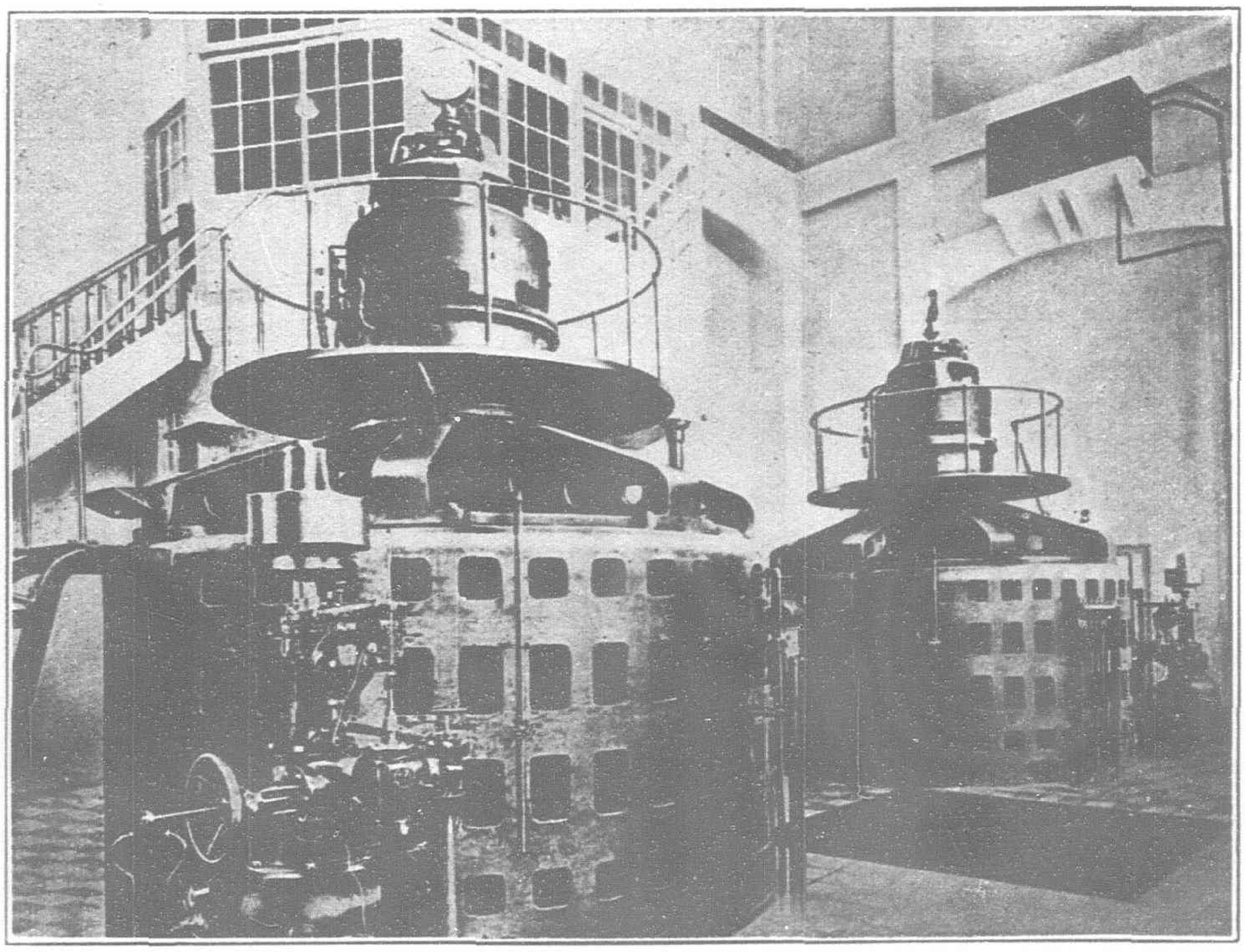

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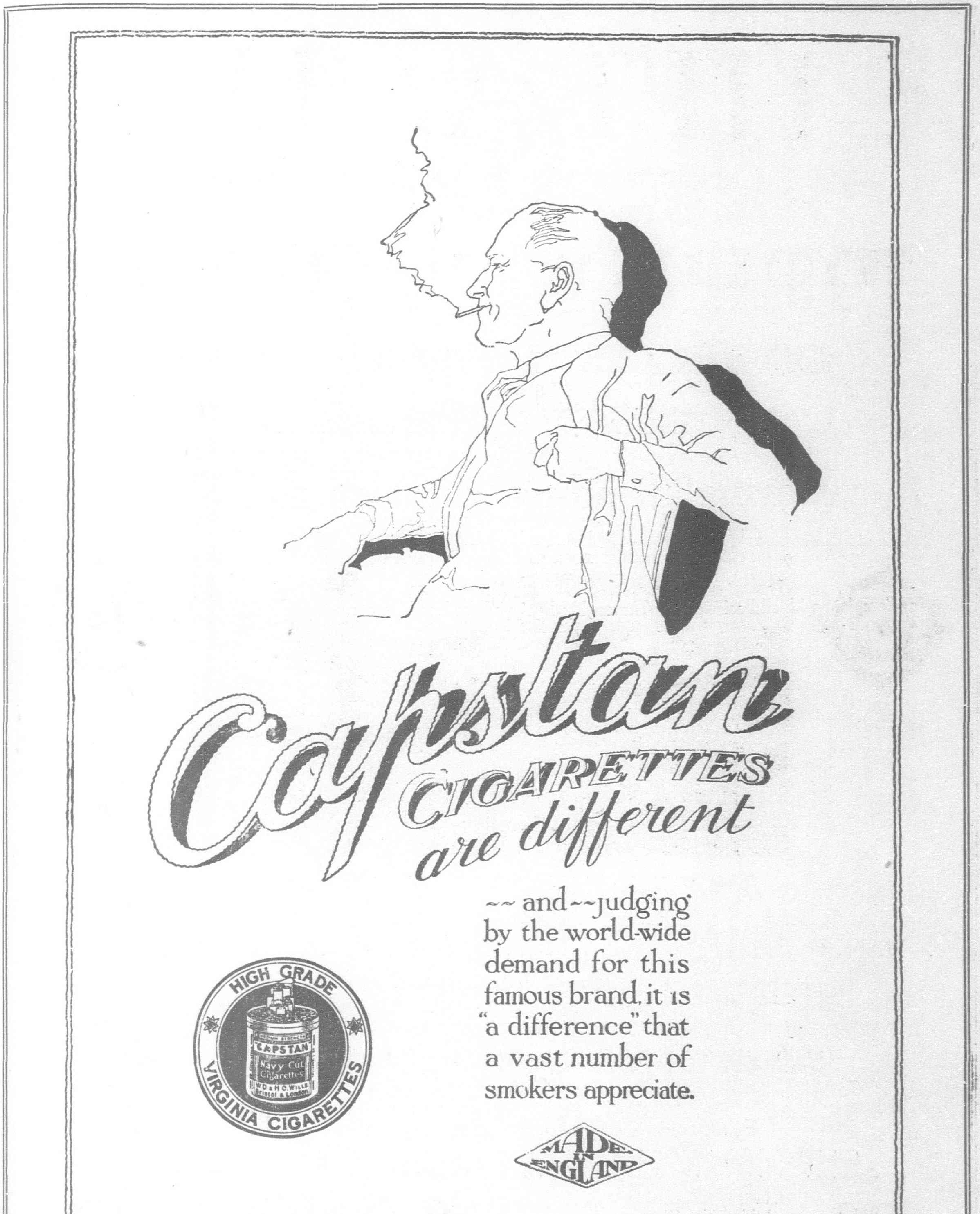

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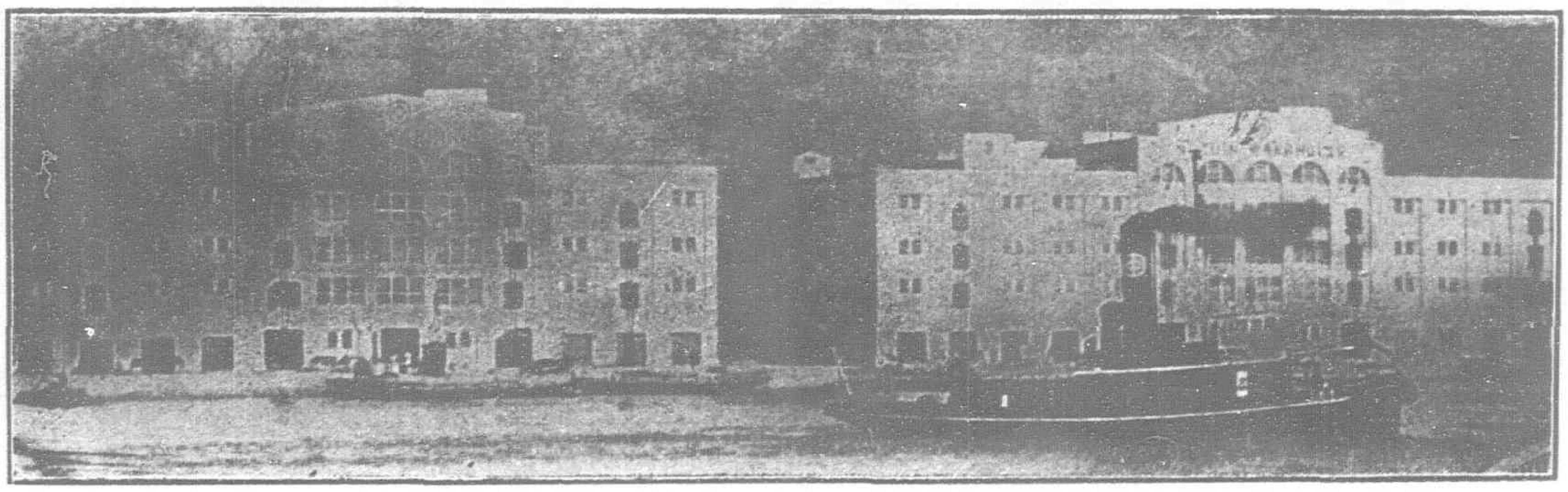

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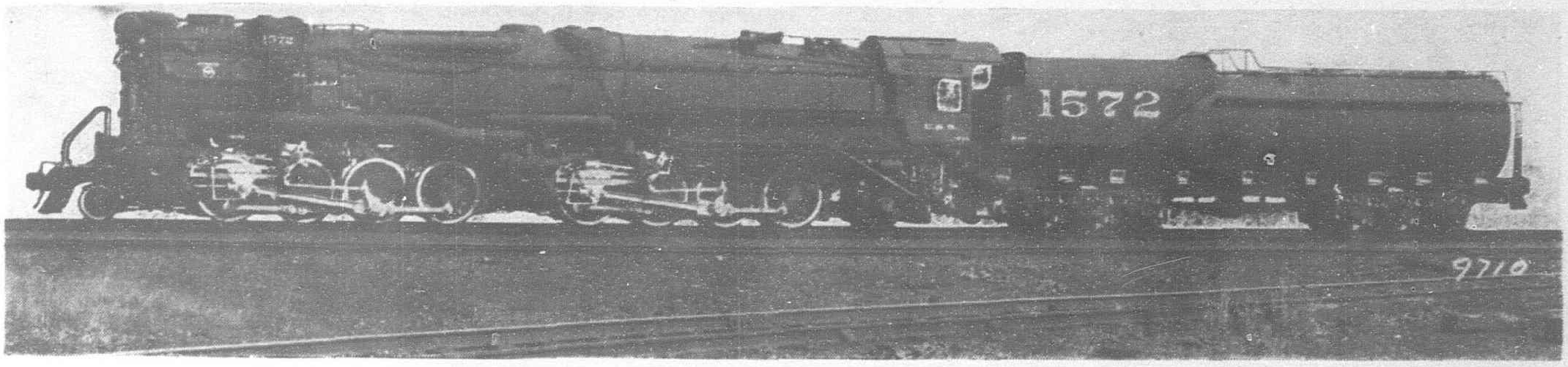

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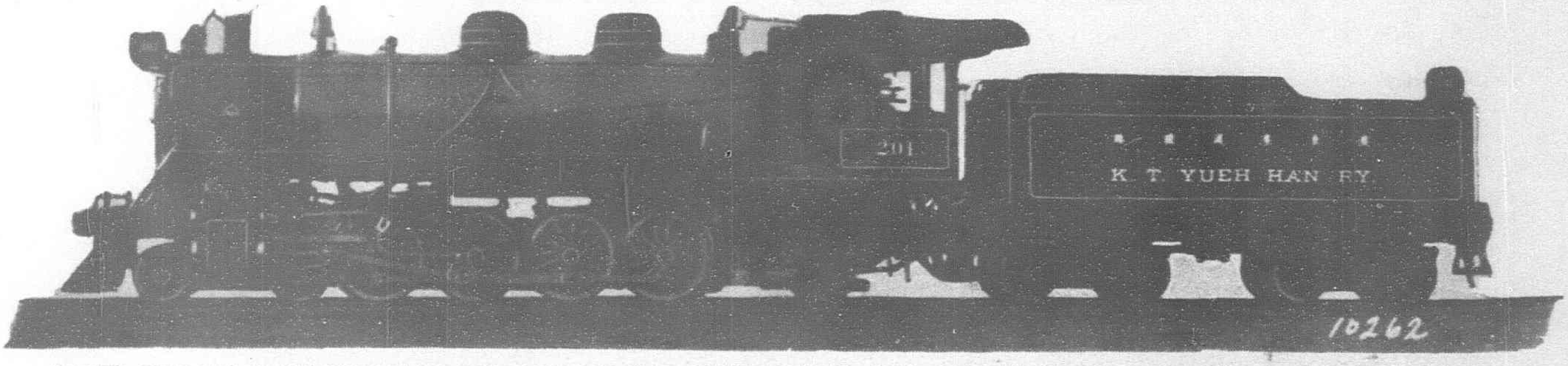

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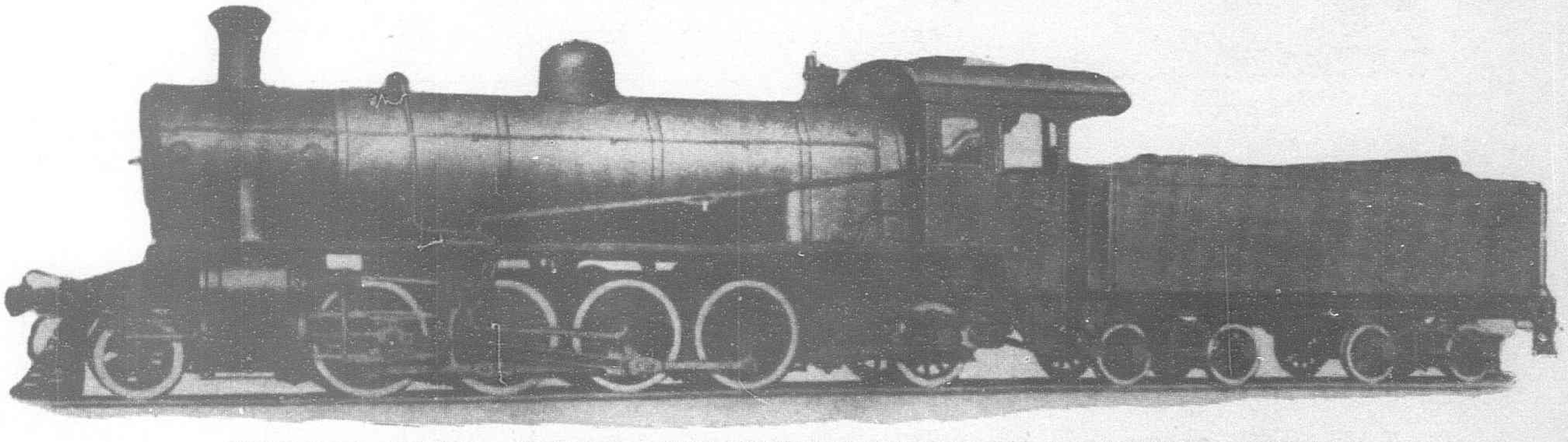

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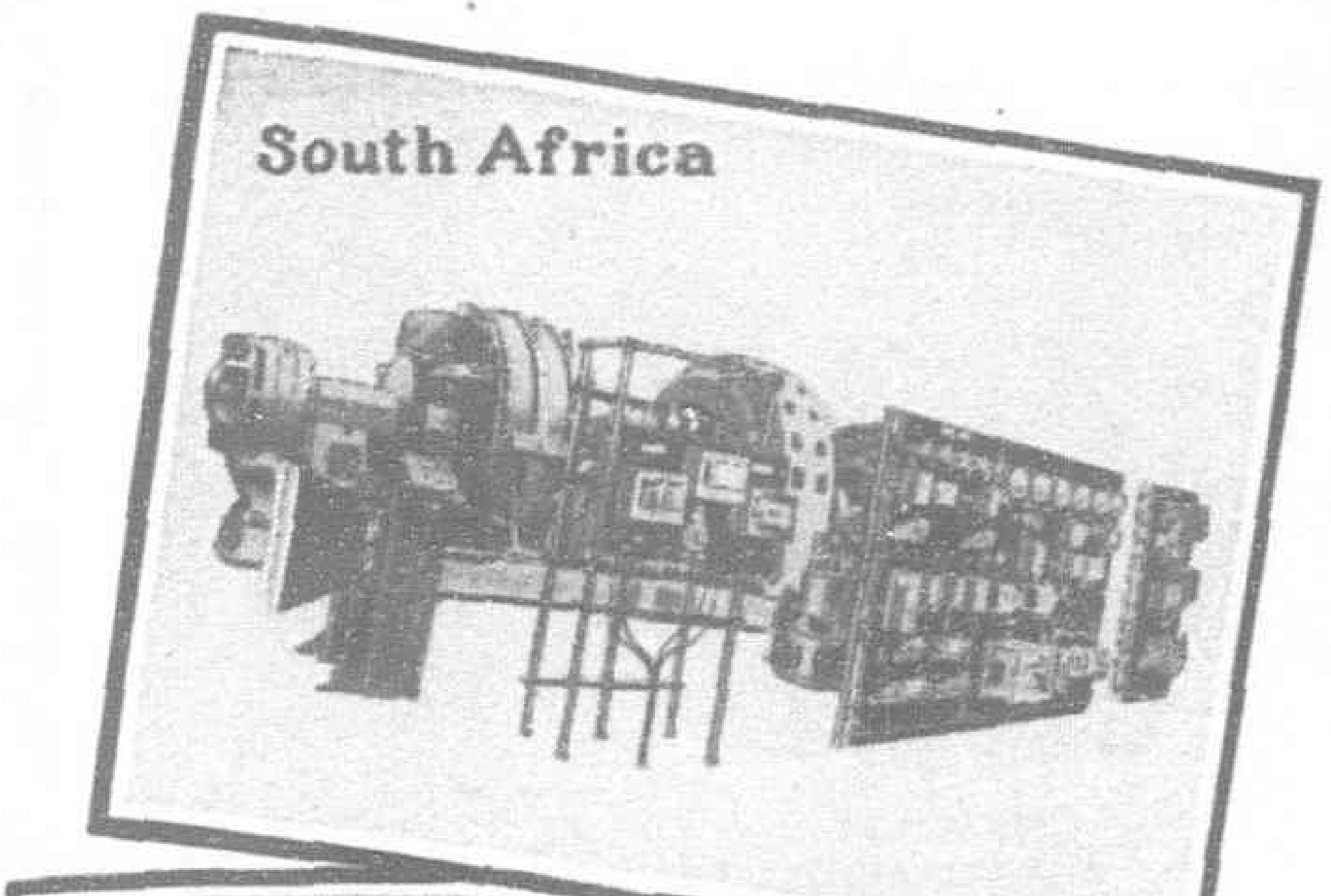
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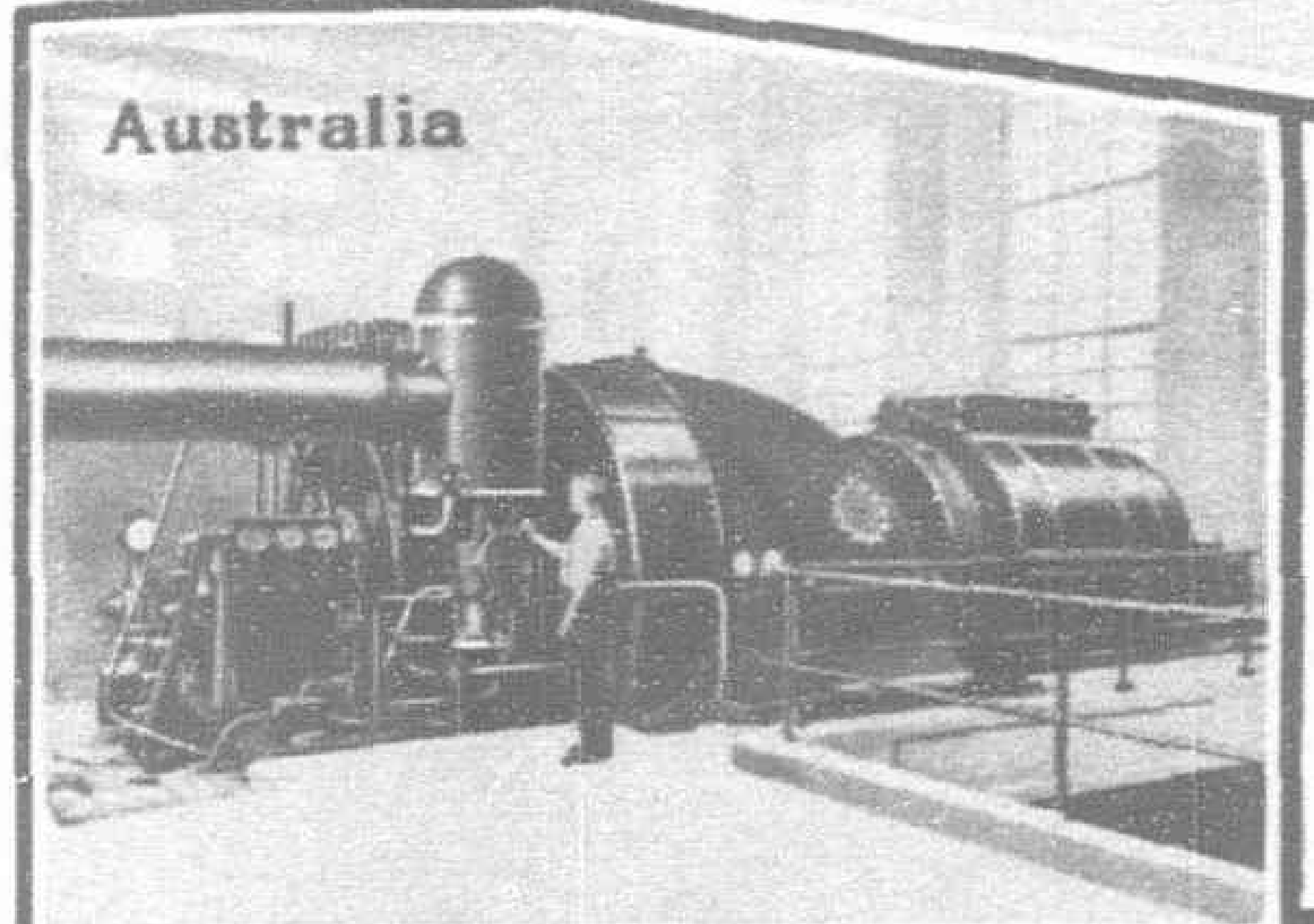
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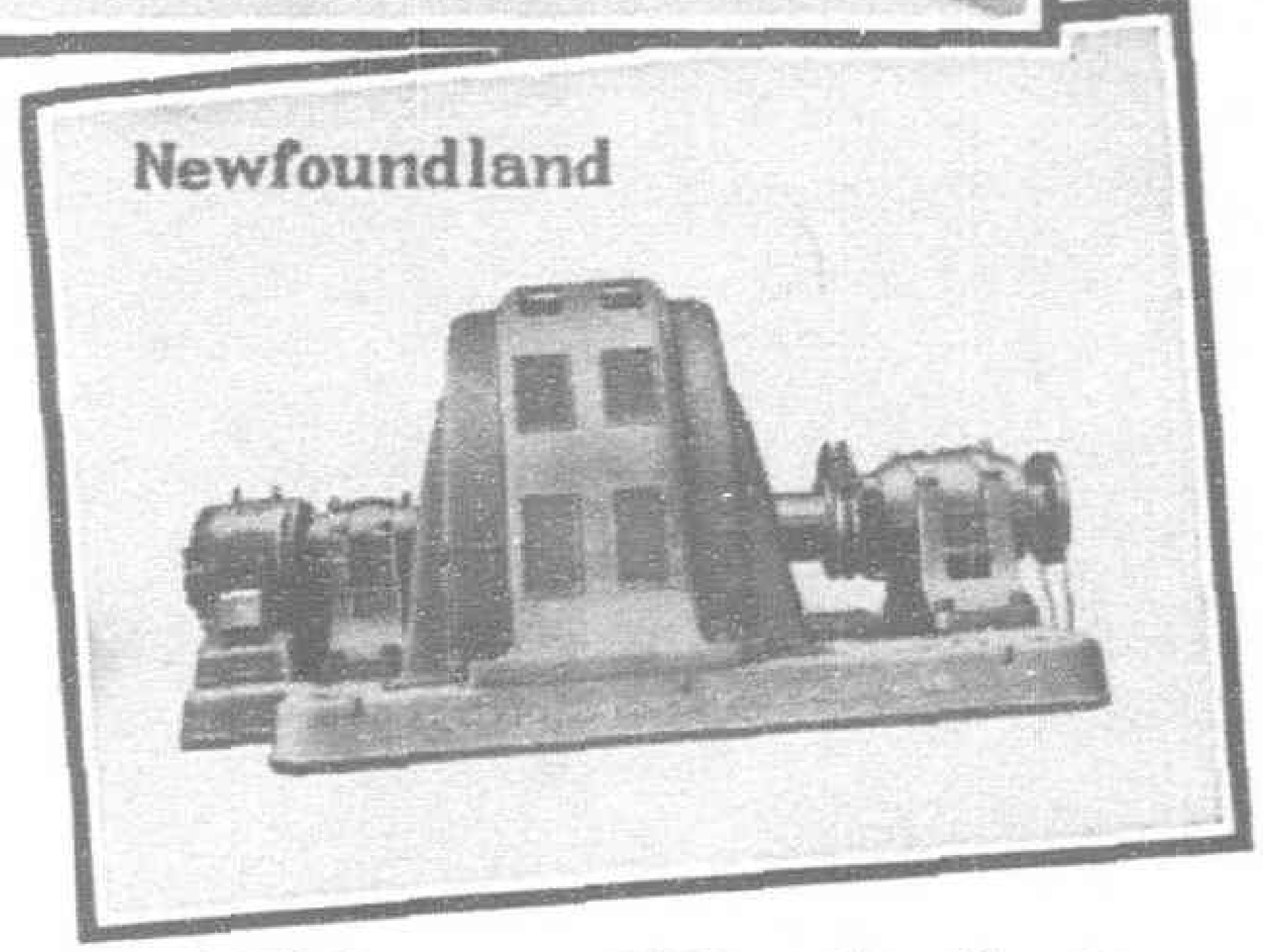
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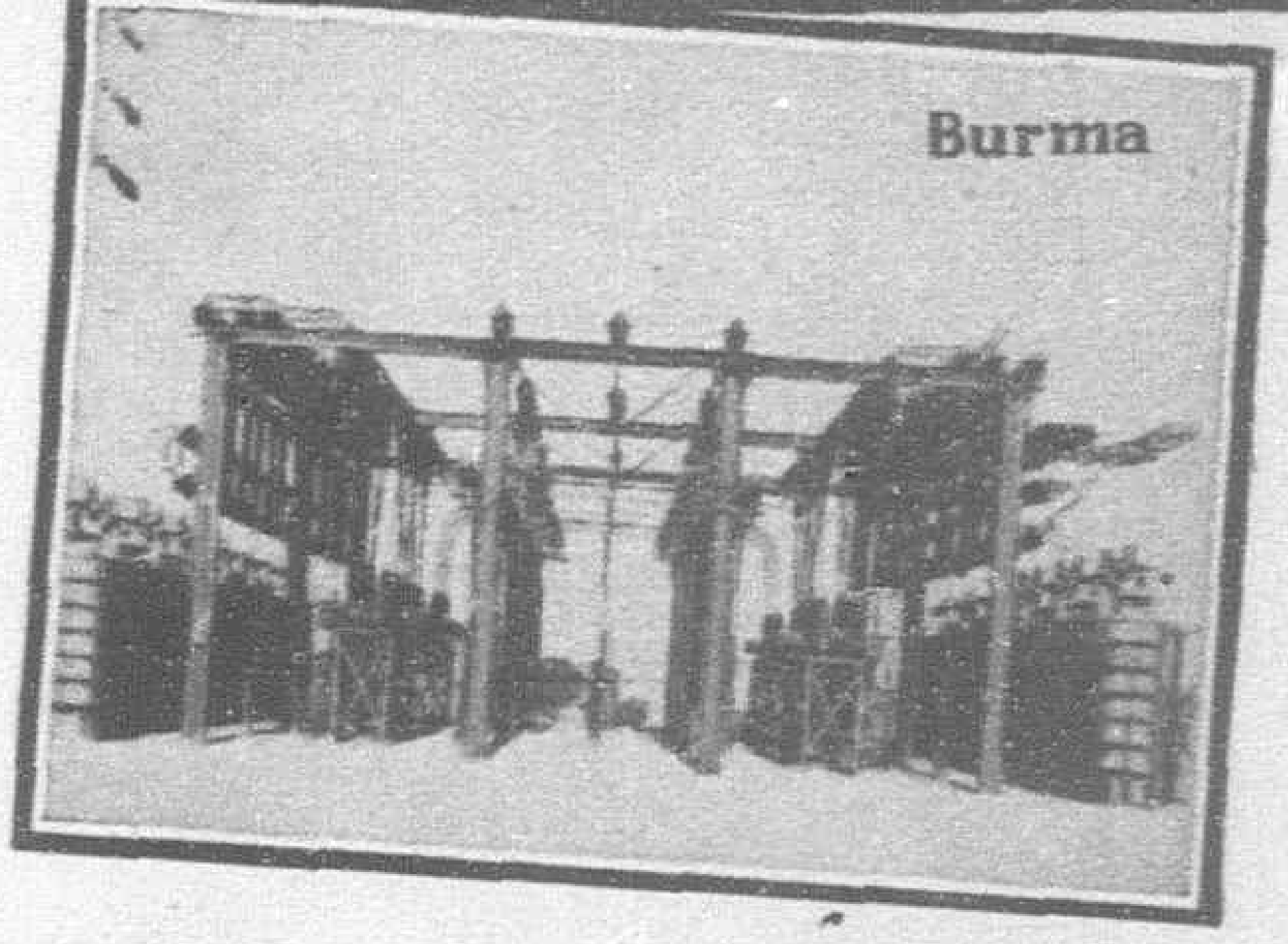
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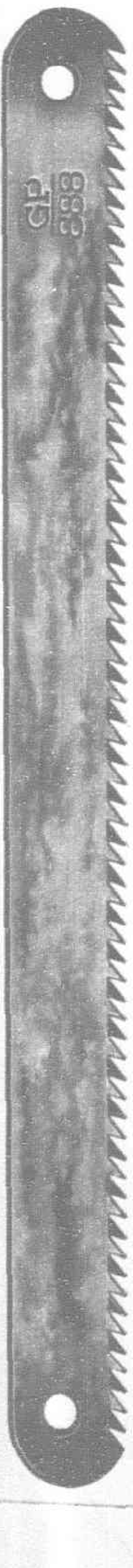

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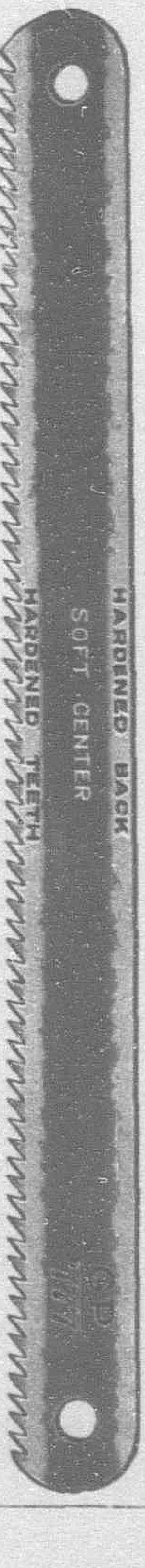

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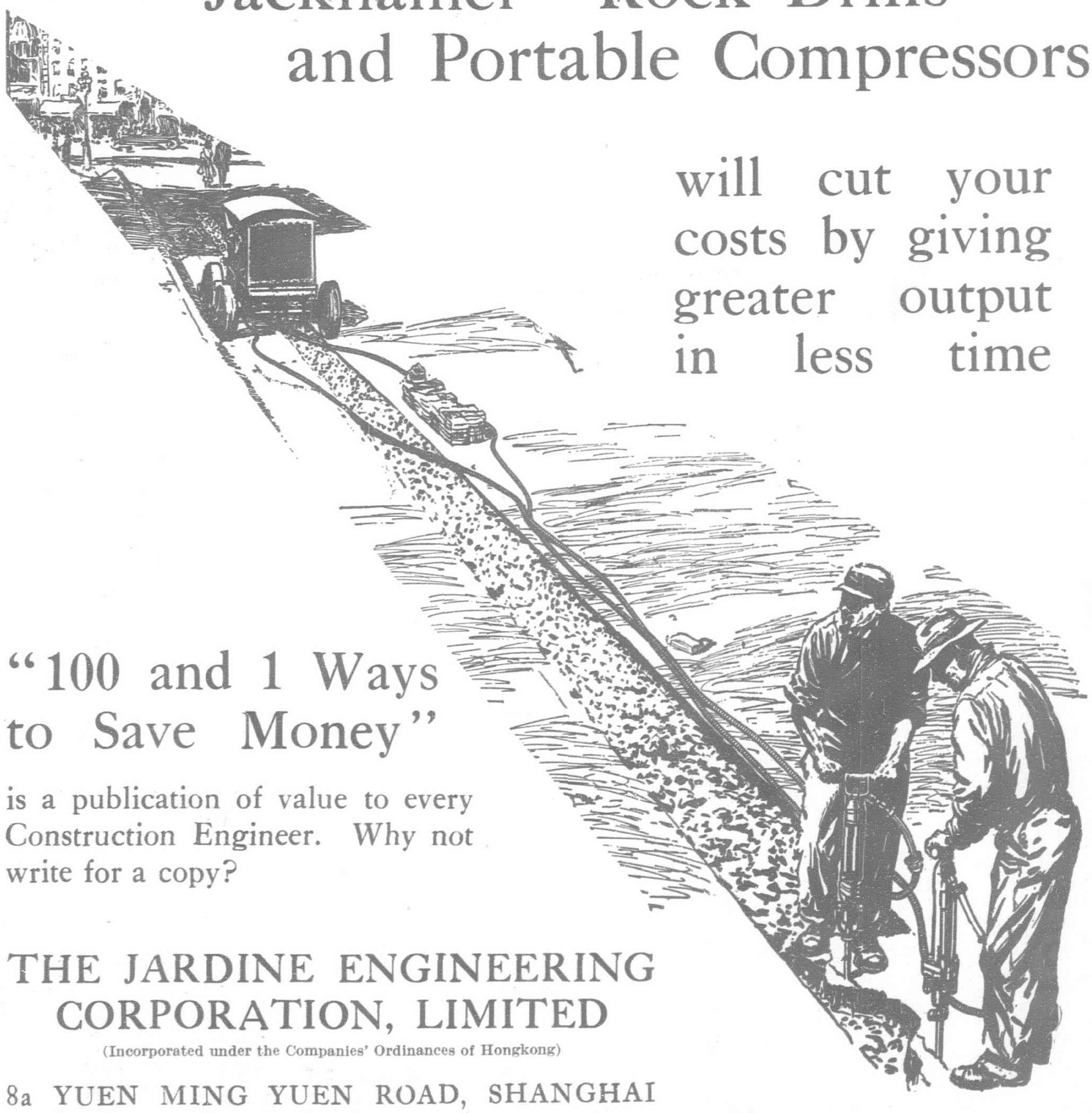

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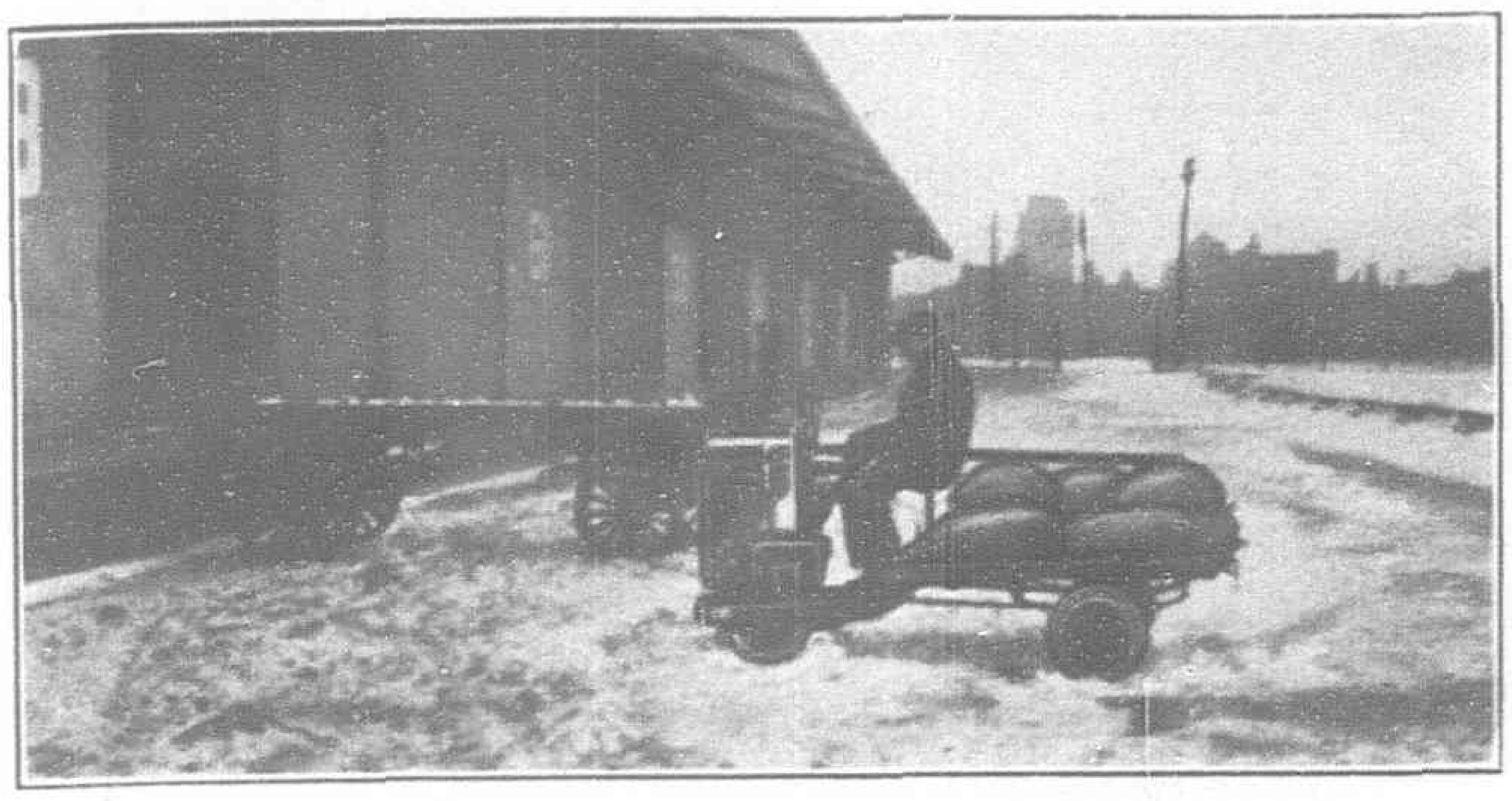

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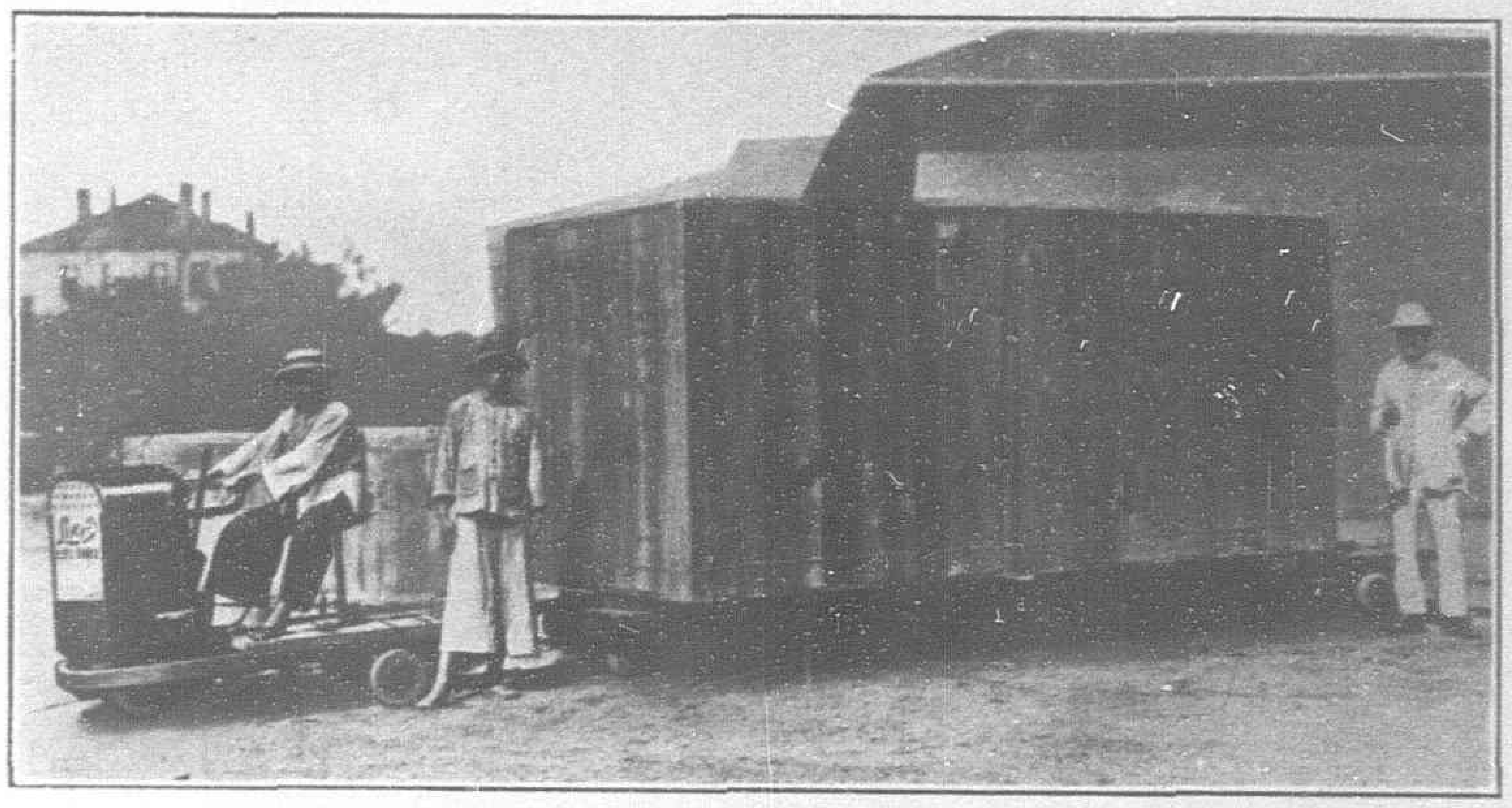

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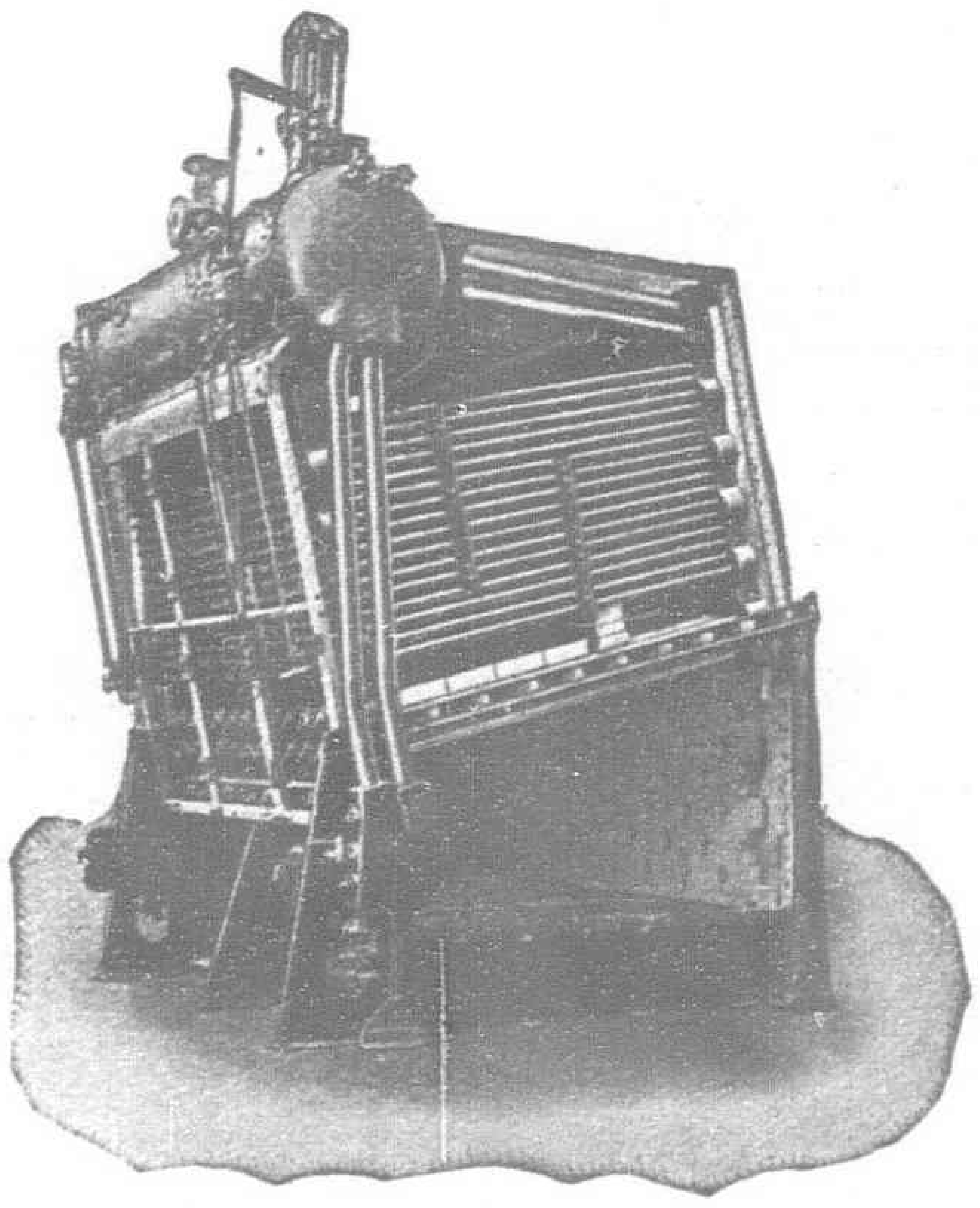

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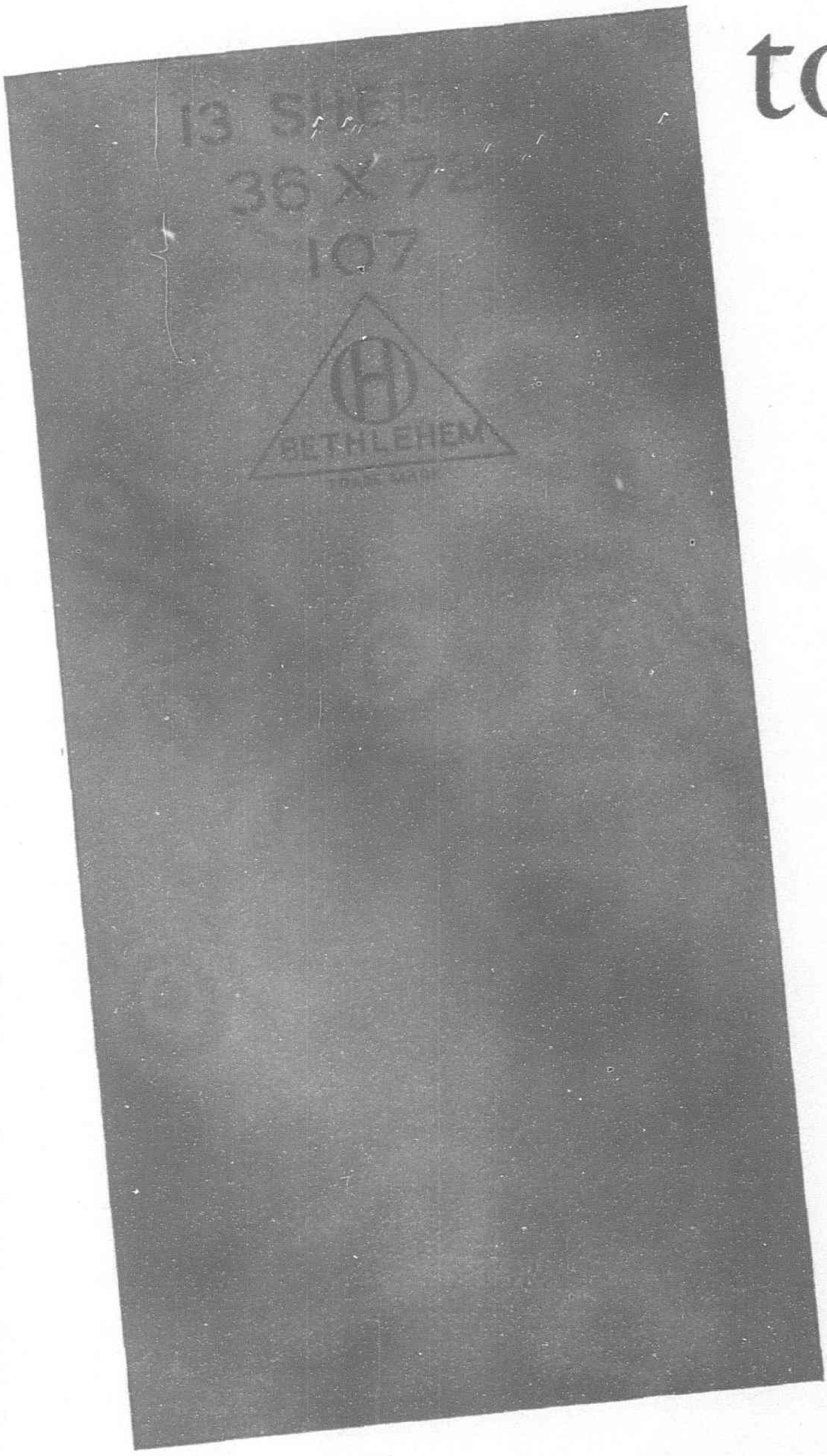

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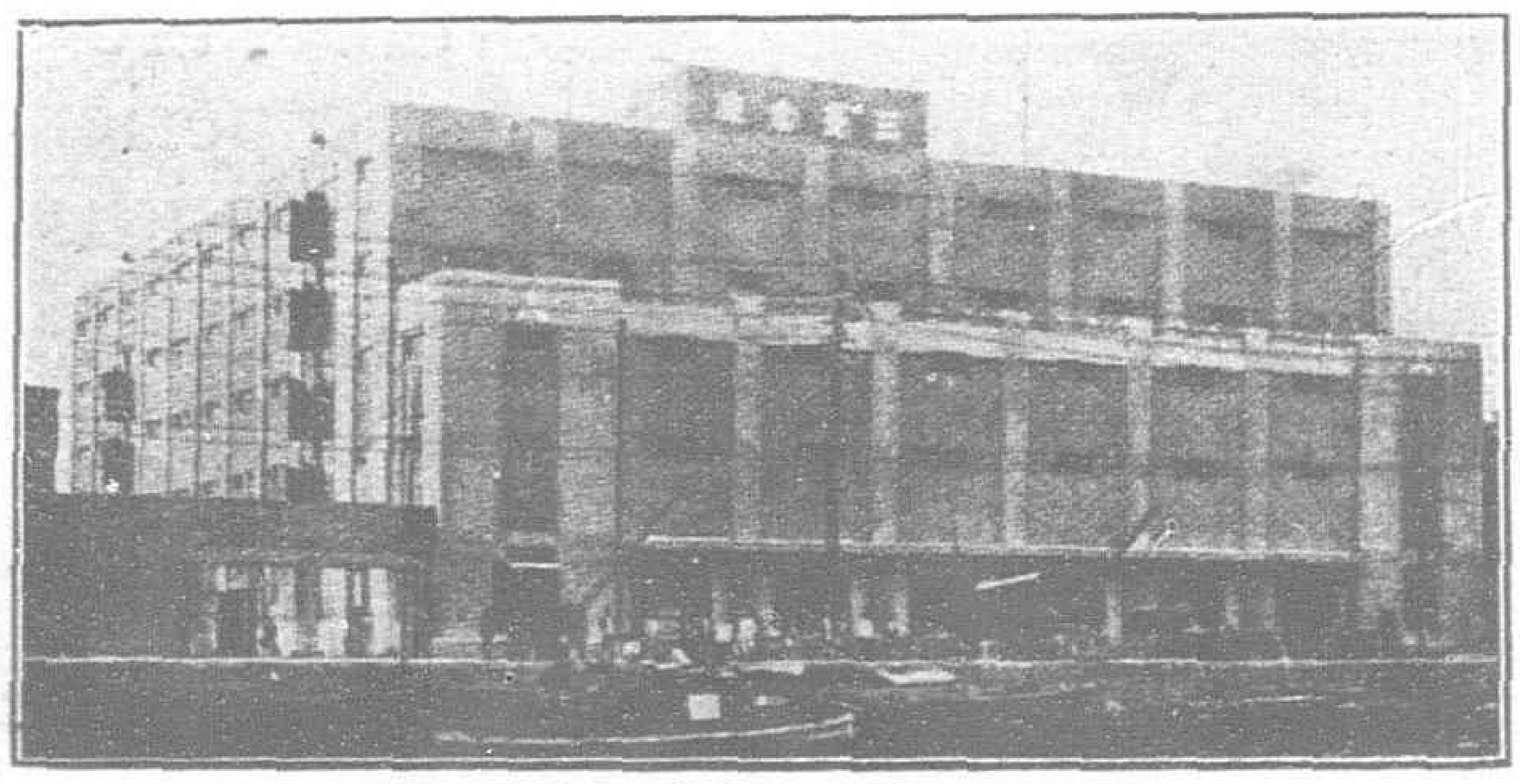

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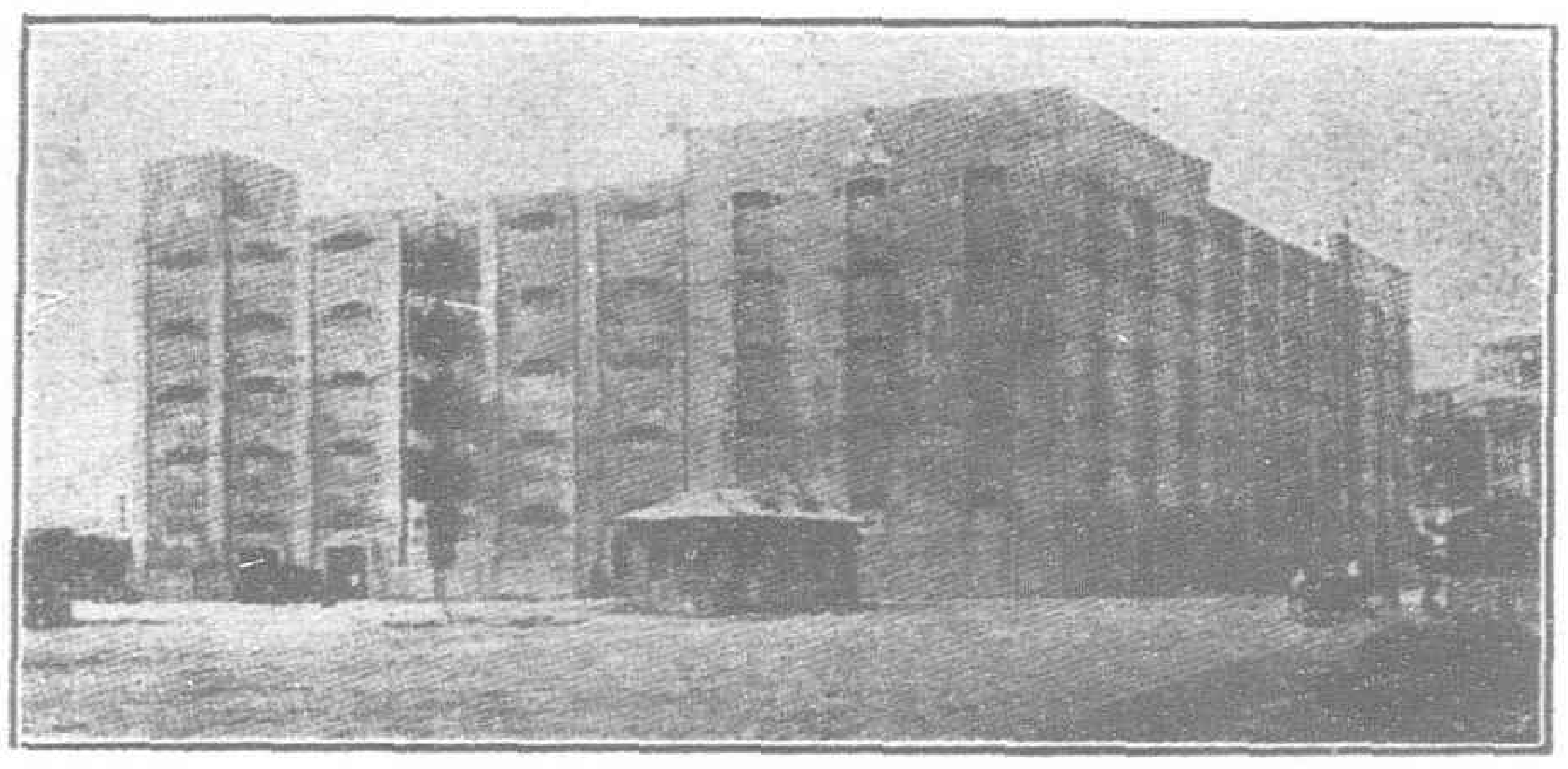

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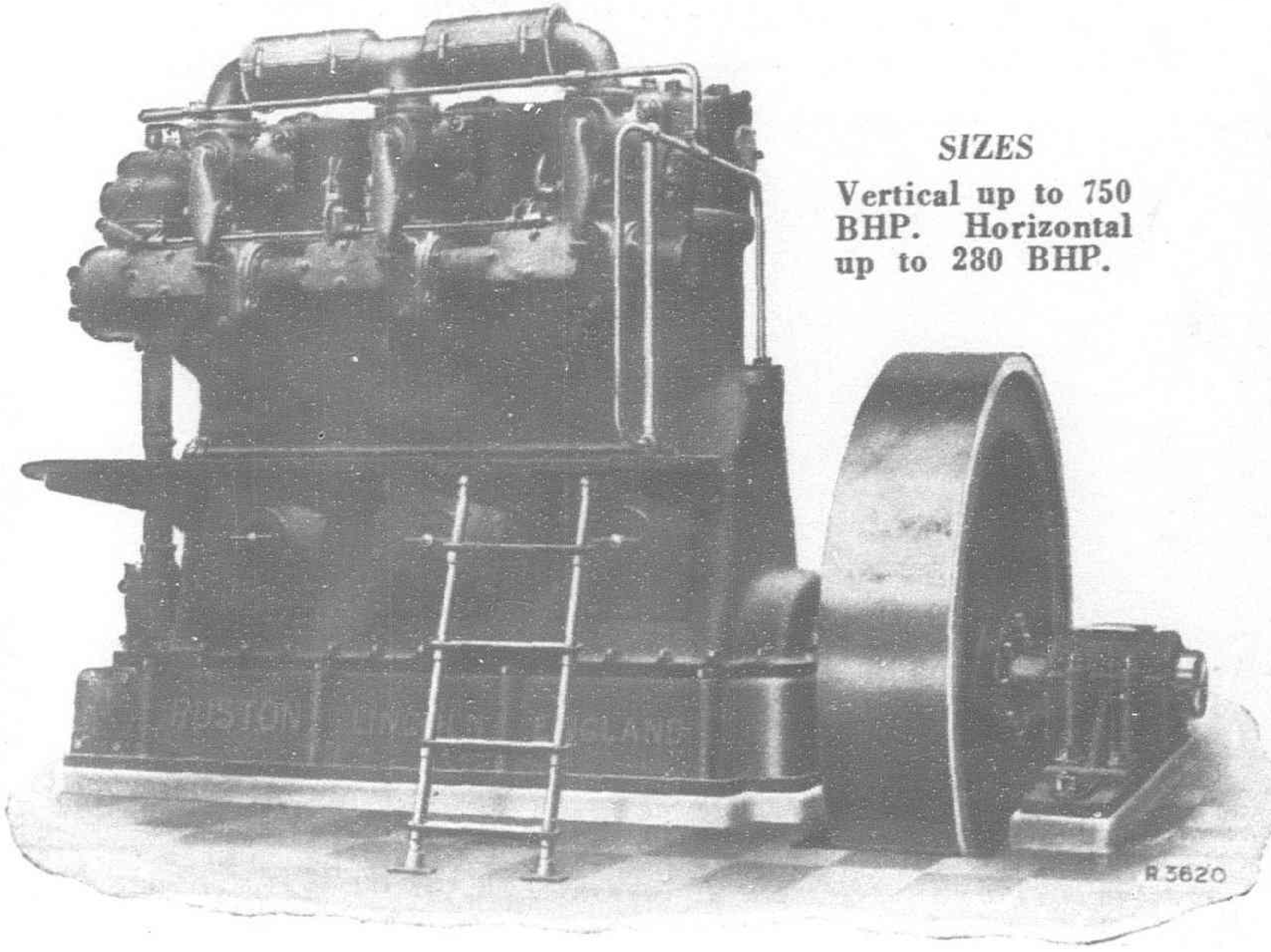

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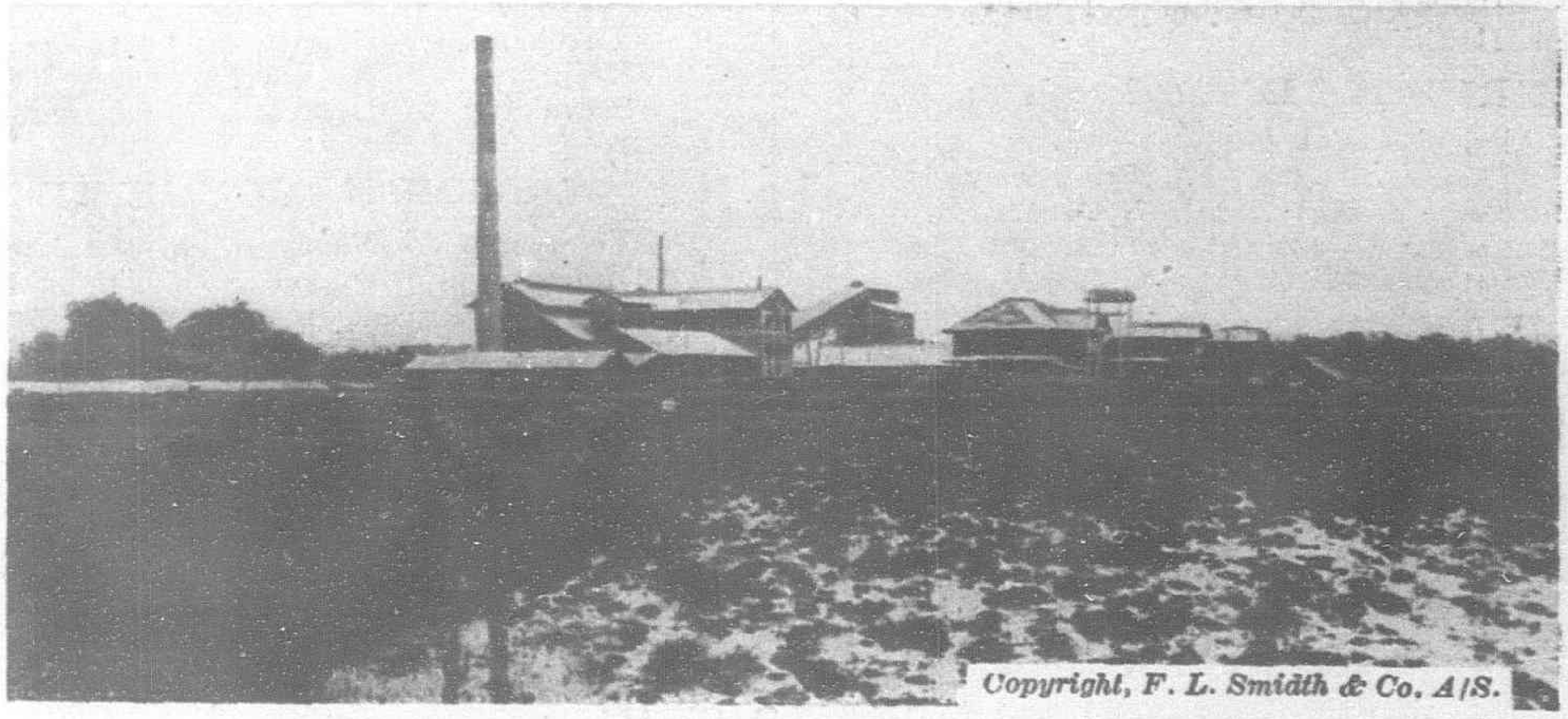

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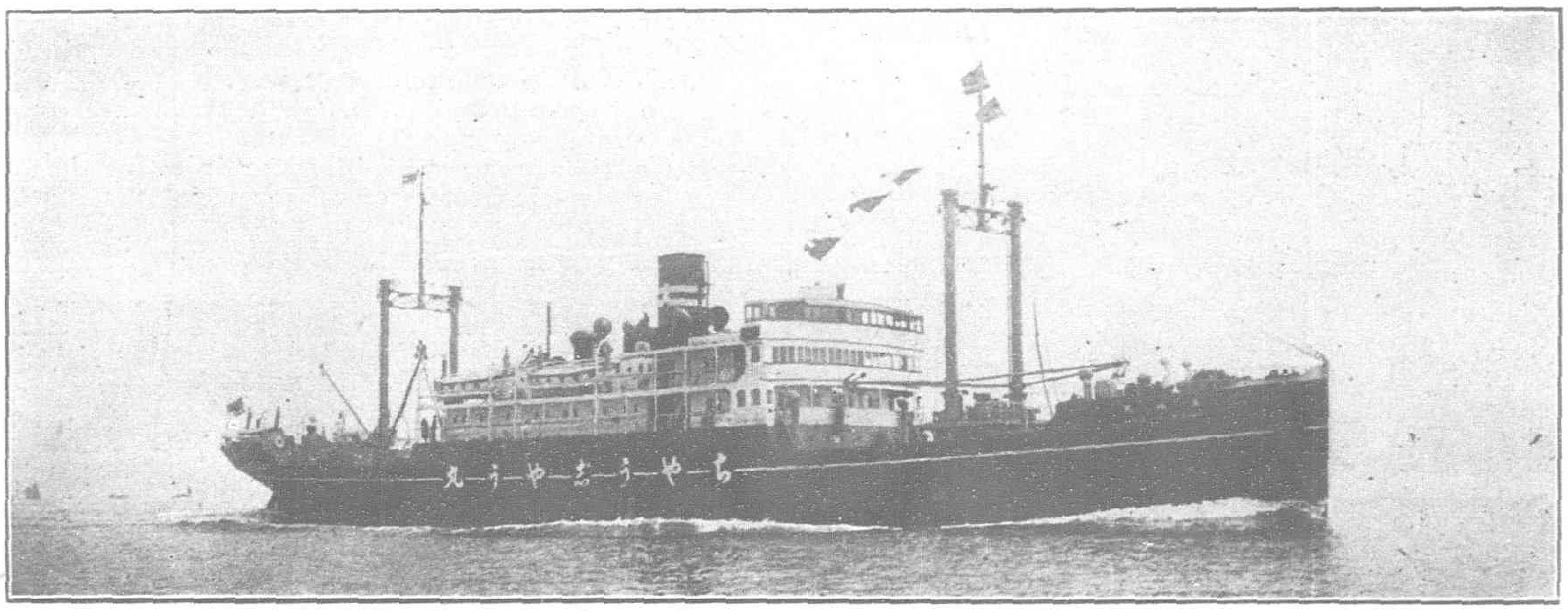

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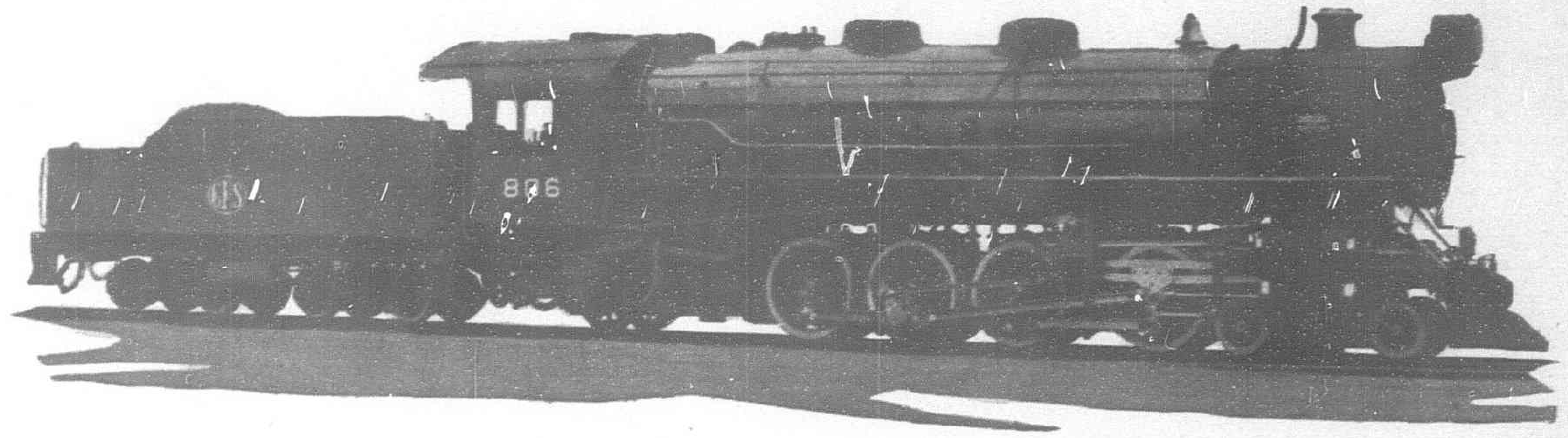

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Gauge of Track—3 feet 3⅜ inches.

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HONCHO, NIHOMBASHI-KU, TOKIO

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Reserve Fund: Yen. 53,280,000
(Nov. 1927)

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Sawmill and Shipowners, and Shipbuilders

Established 1876

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AND
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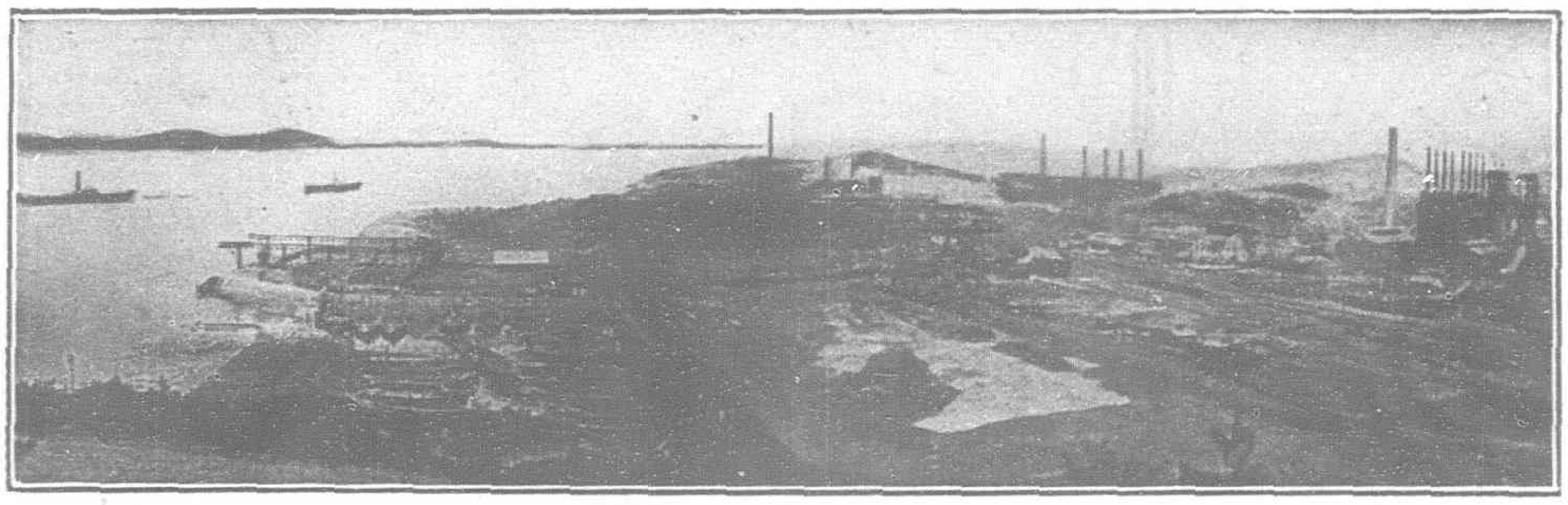
(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE:
MARUNOUCHI, TOKYO

CAPITAL (PAID UP):
YEN 30,000,000

MILL (LLOYD'S APPROVED):
KENJIHO, CHOSEN (KOREA)



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PRODUCTS:—PIG IRON—Basic and Foundry 100,000 tons.
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MARINE & FIRE
INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN
K. KAISHA

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MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000,000
PAID-UP CAPITAL - - - „ 1,250,000

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Acetylene, Benzine and Electric Lamps
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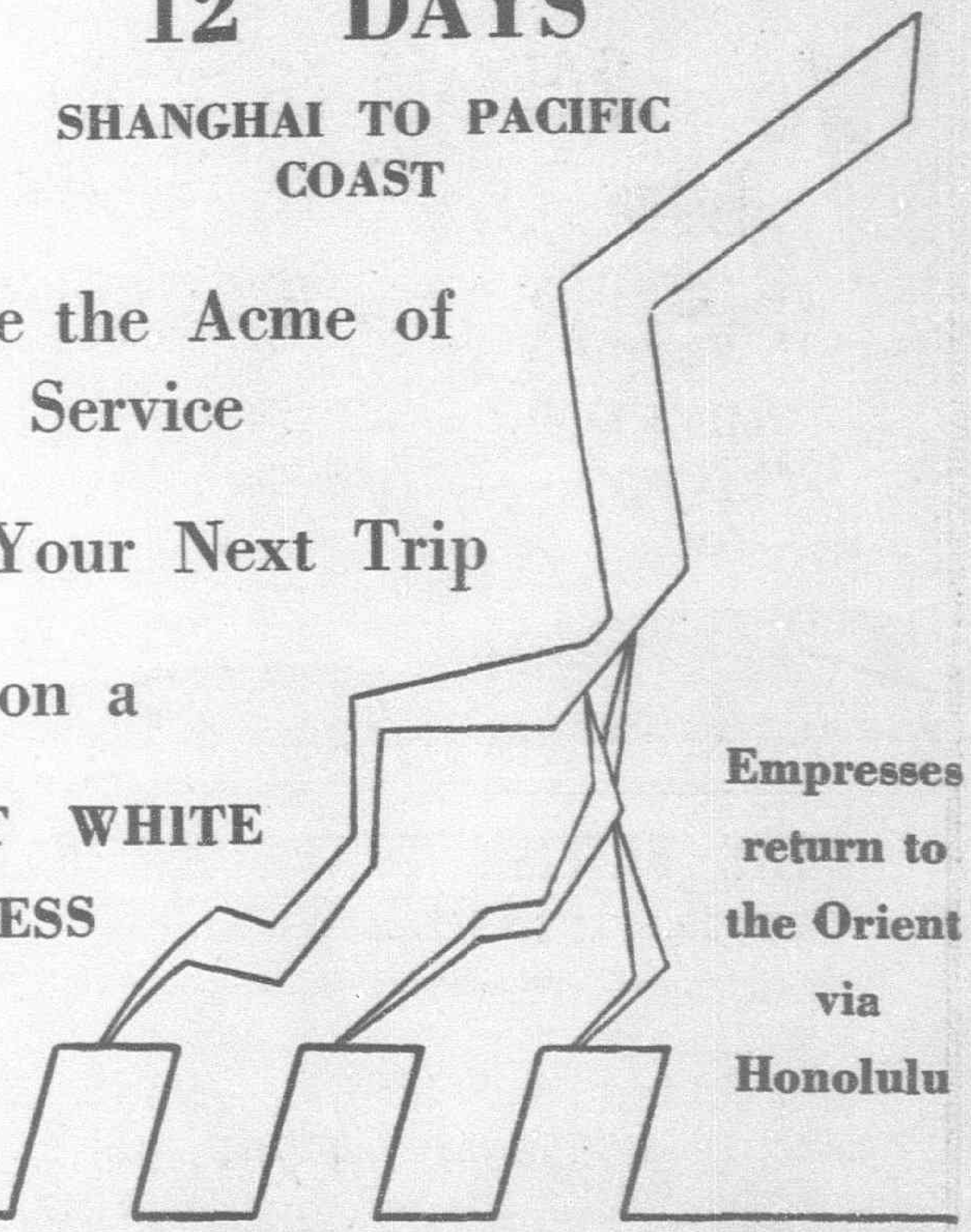

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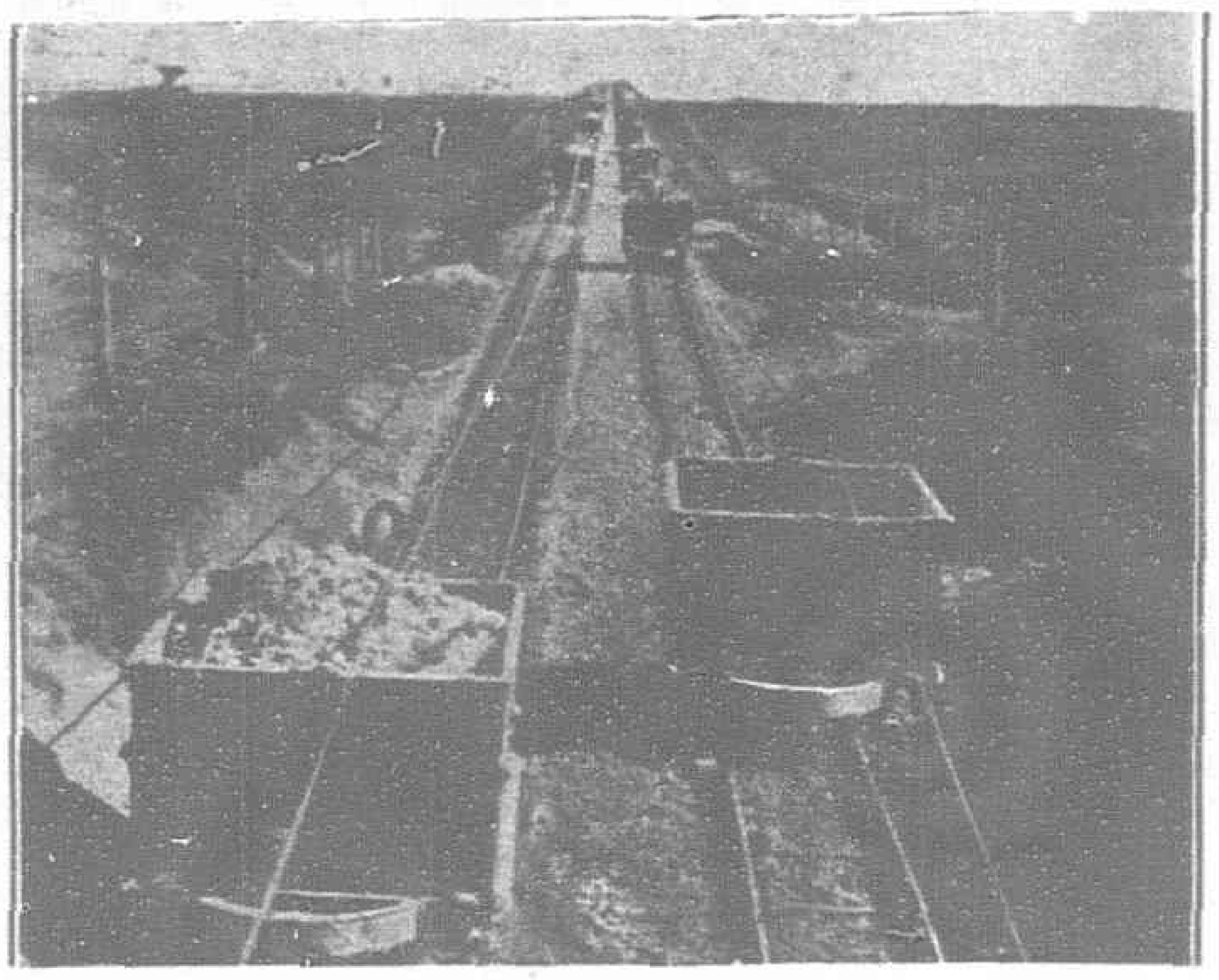

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The trend of electric supply tariffs is to impose higher rates for energy supplied to apparatus with a low power factor. ¶Raising the Power Factor then, not only increases the capacity of transmission lines, cables, transformers, etc., but actually cheapens the energy used by the consumer. ¶ "Metrovick" Synchronous Induction Motors are arranged for taking energy at unity or at a leading power factor, and can be used to compensate for low power factor in other apparatus even with wide fluctuations of load. ¶The illustration shows a "Metrovick" 340 h.p. 250 r.p.m. self-contained, Synchronous Induction Motor for a 6,600-volt, 3-phase, 50-period circuit. ¶These motors are particularly suitable for the direct driving of compressors, line shafting in textile mills, pumps, cement mills, etc.

Send for descriptive list 41/1-1.

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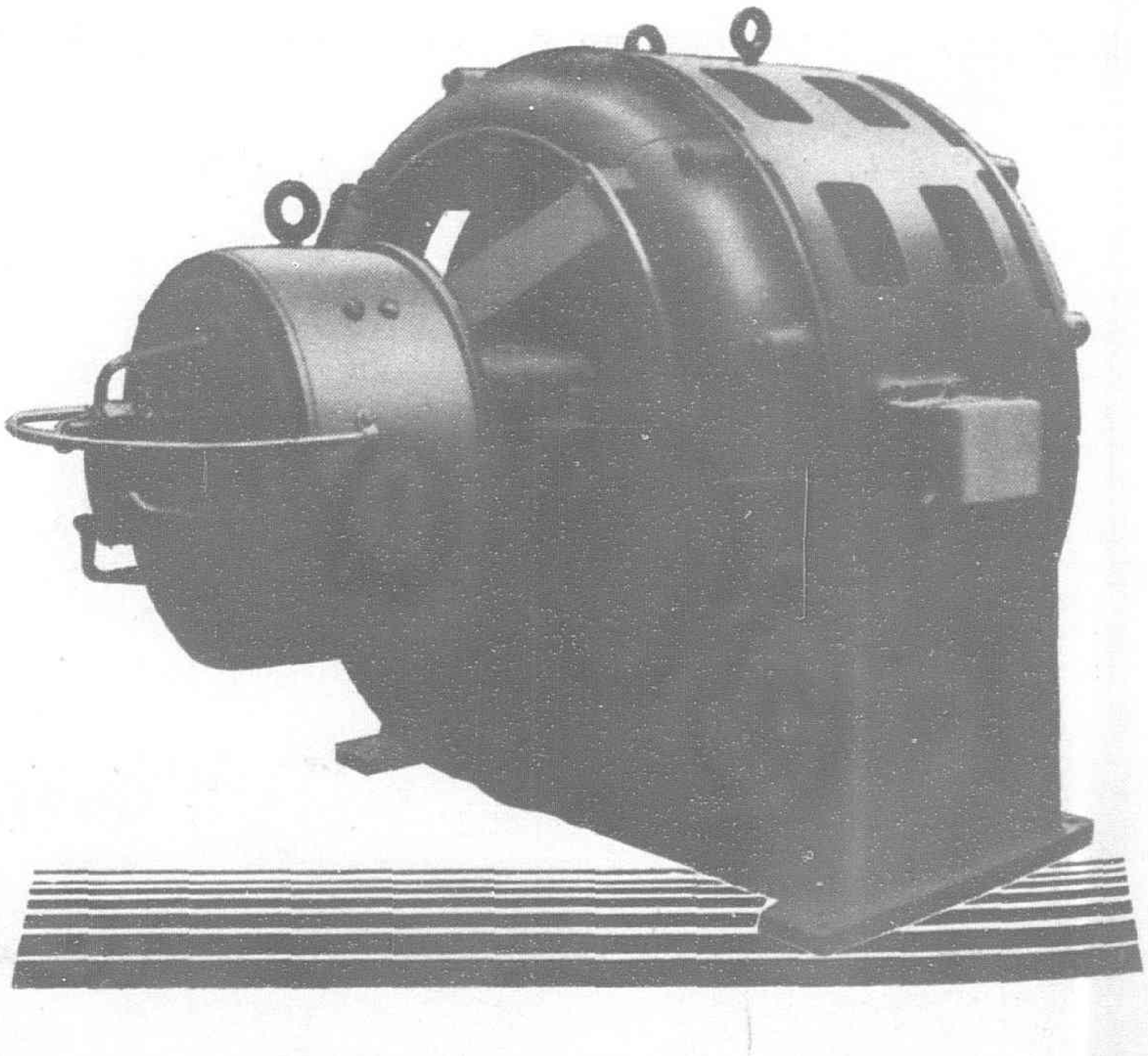

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With GENUINE Williams' Improved "Vulcan" Tongs to pay a handsome profit on their cost. Double-ended, reversible jaws mean double length of life for the tool. Proof-tested, CERTIFIED chain assures safety to the operator.

Easy adjustment, instant grip, simple to handle —"Vulcans" save your men's time. Time is money. "Vulcans" save both. 9 sizes for $\frac{1}{8}$ to 18-in. pipe. Fully guaranteed. Get a GENUINE "Vulcan" to-day.

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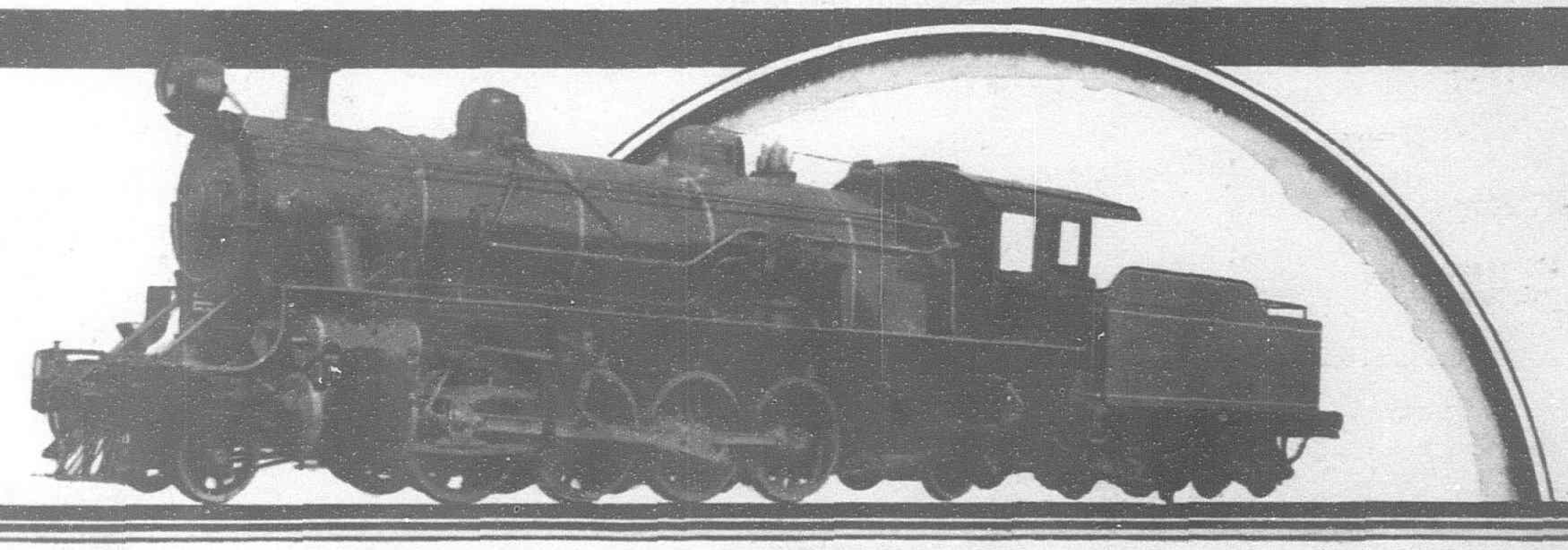
"VULCAN"
IMPROVED



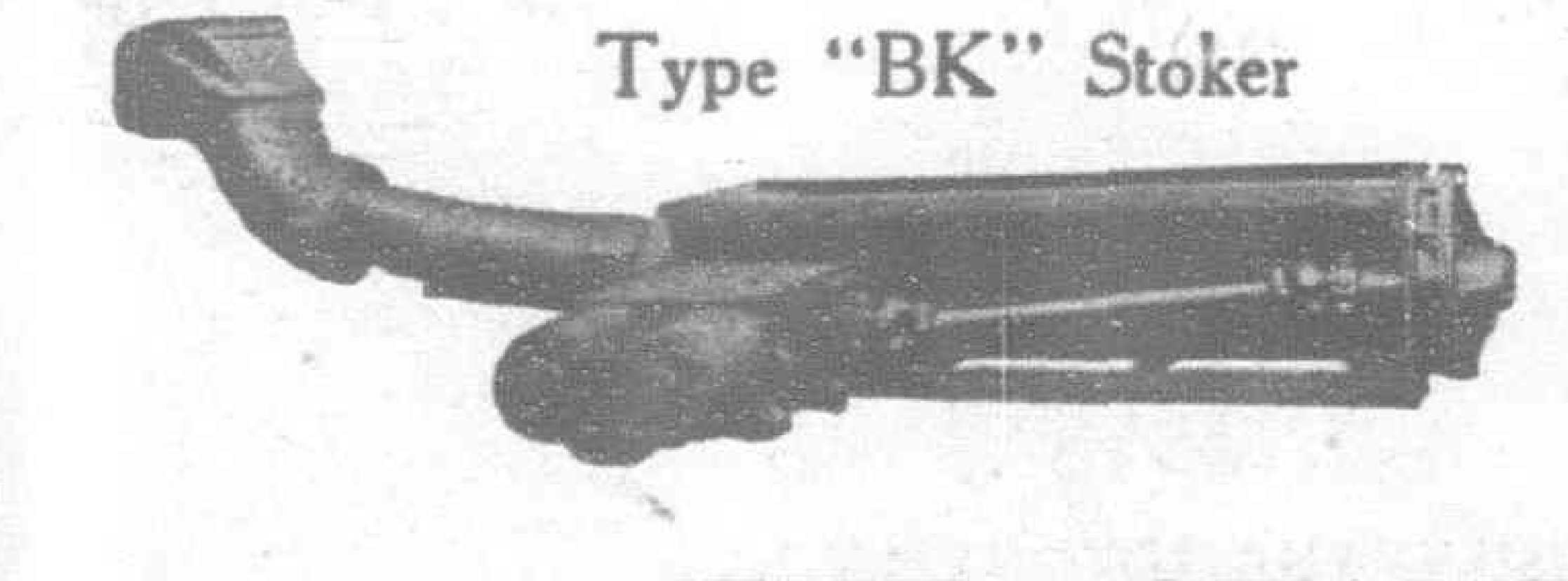
REDUCES
FUEL COSTS

REDUCTION in fuel costs can be obtained in only two ways—use of the cheapest grade of fuel—getting maximum hauling capacity from every pound of fuel burned.

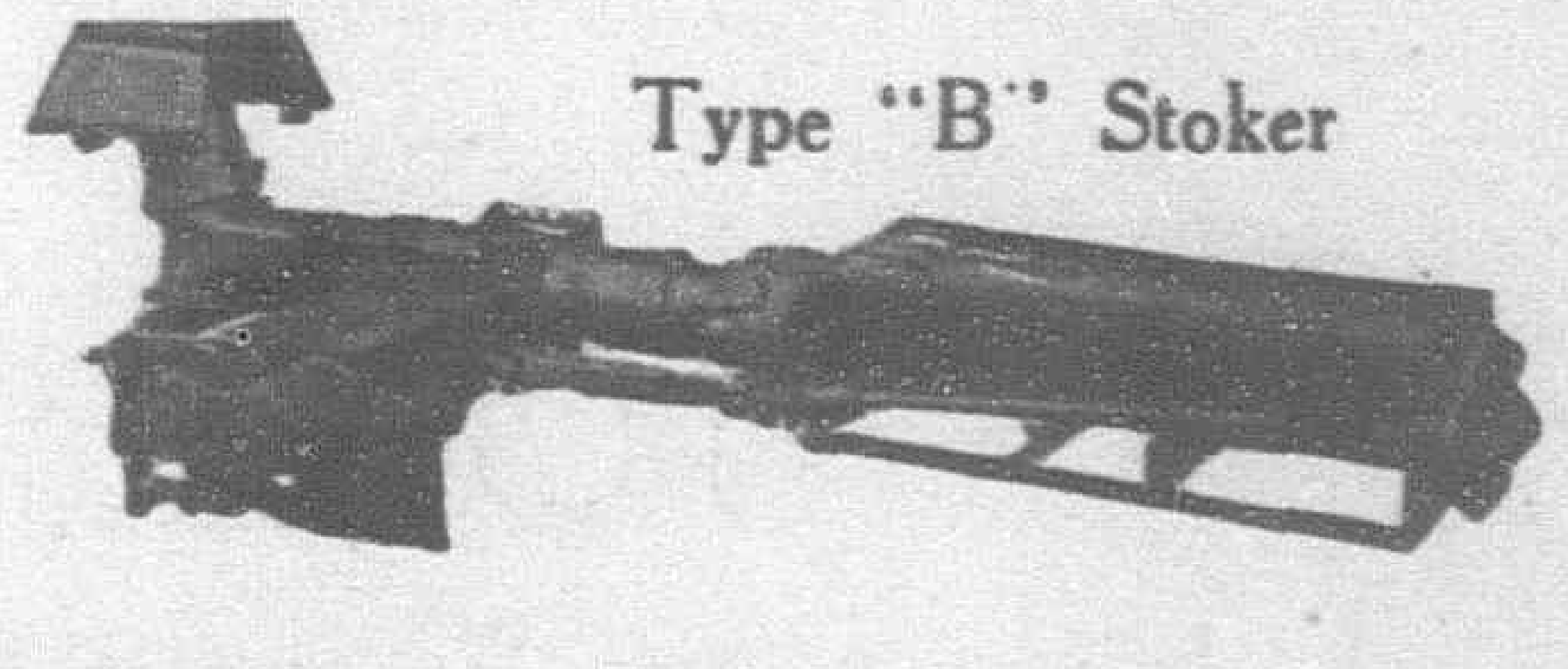
Stoker firing accomplishes both of these.

Through stoker firing the cheaper grades of fuel can be successfully and economically burned and the full hauling capacity of the locomotive realized by more efficient firing.

Therefore, the gain, through stoker firing is two-fold.

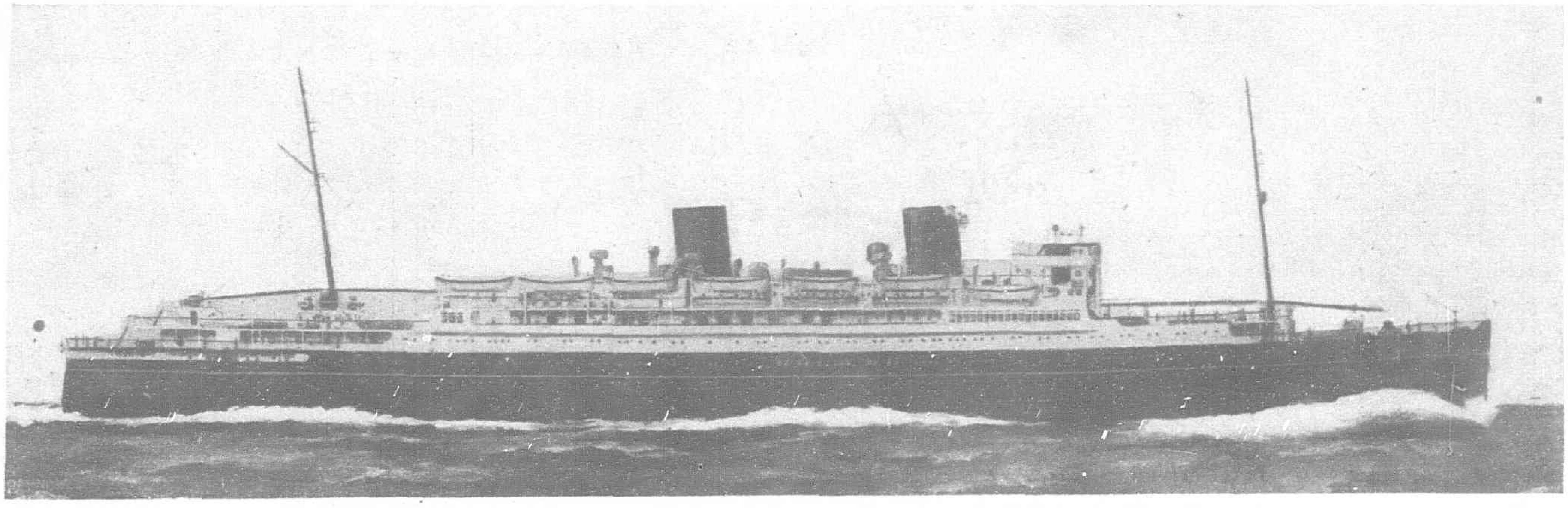


Type "BK" Stoker



Type "B" Stoker

THE STANDARD STOKER COMPANY, INC.
NEW YORK ERIE CHICAGO



Trans-pacific motor passenger liners "Asama-Maru" and "Tatsuta-Maru" under construction at Nagasaki Works, Mitsubishi Zosen Kaisha for the Nippon Yusen Kaisha.
Dimension 560-ft. by 72-ft. by 42-ft. moulded. Gross tonnage 16,700 tons.

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

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	DOCK No. 1	DOCK No. 2	DOCK No. 3
Extreme Length	523 Ft.	371 Ft.	728.9 Ft.
Length on Blocks	513 ,,	350 ,,	714 ,,
Width of Entrance on Top	89 ,,	66 ,,	99½ ,,
,, ,, ,, ,, Bottom	77 ,,	53 ,,	88½ ,,
Water on Blocks at Spring Tide	26½ ,,	24 ,,	34½ ,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electric Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

WE MANUFACTURE

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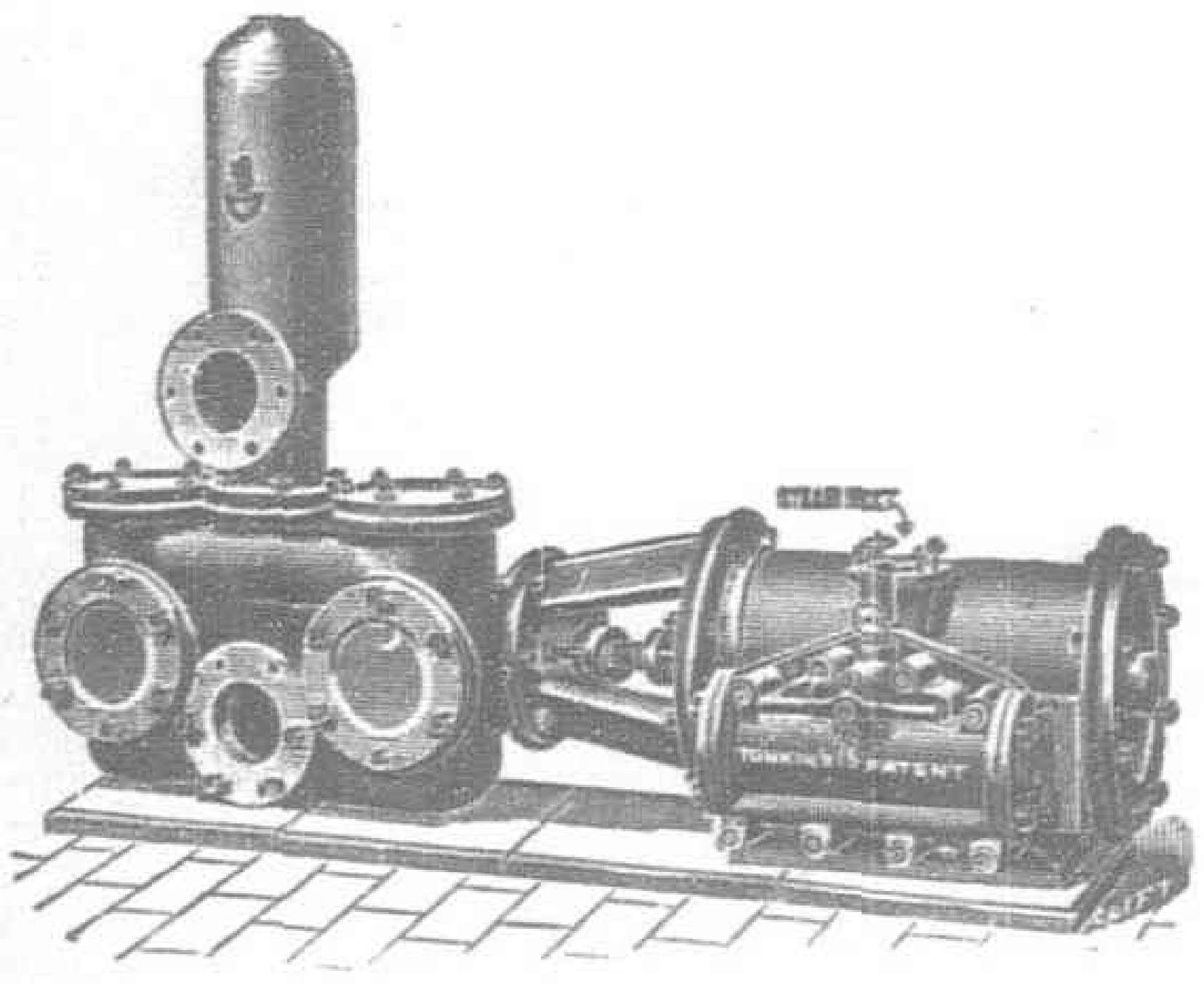
FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND, WATER or ELECTRIC POWER



Steam Pump for General Purposes

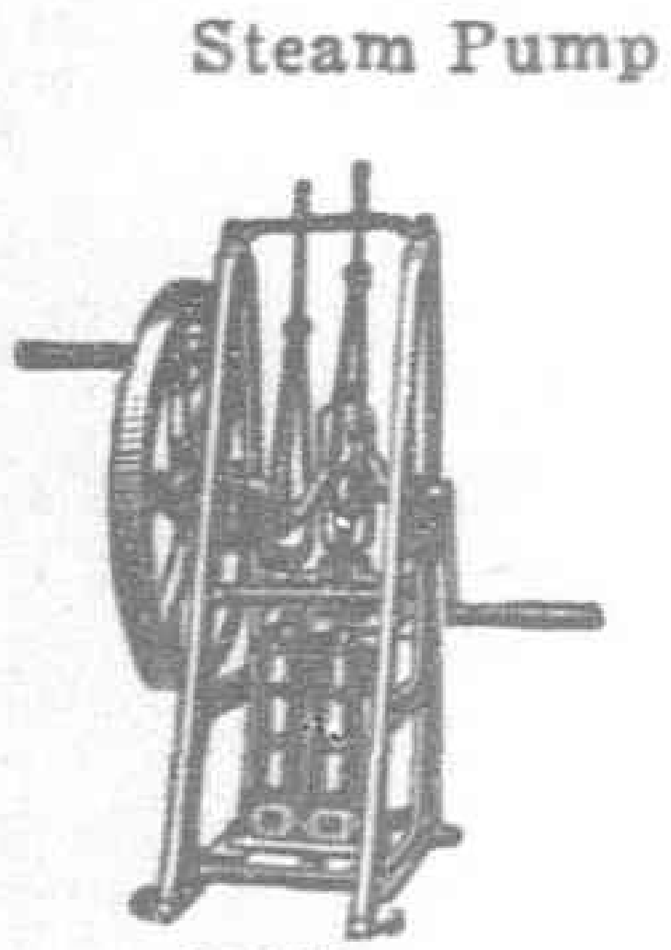
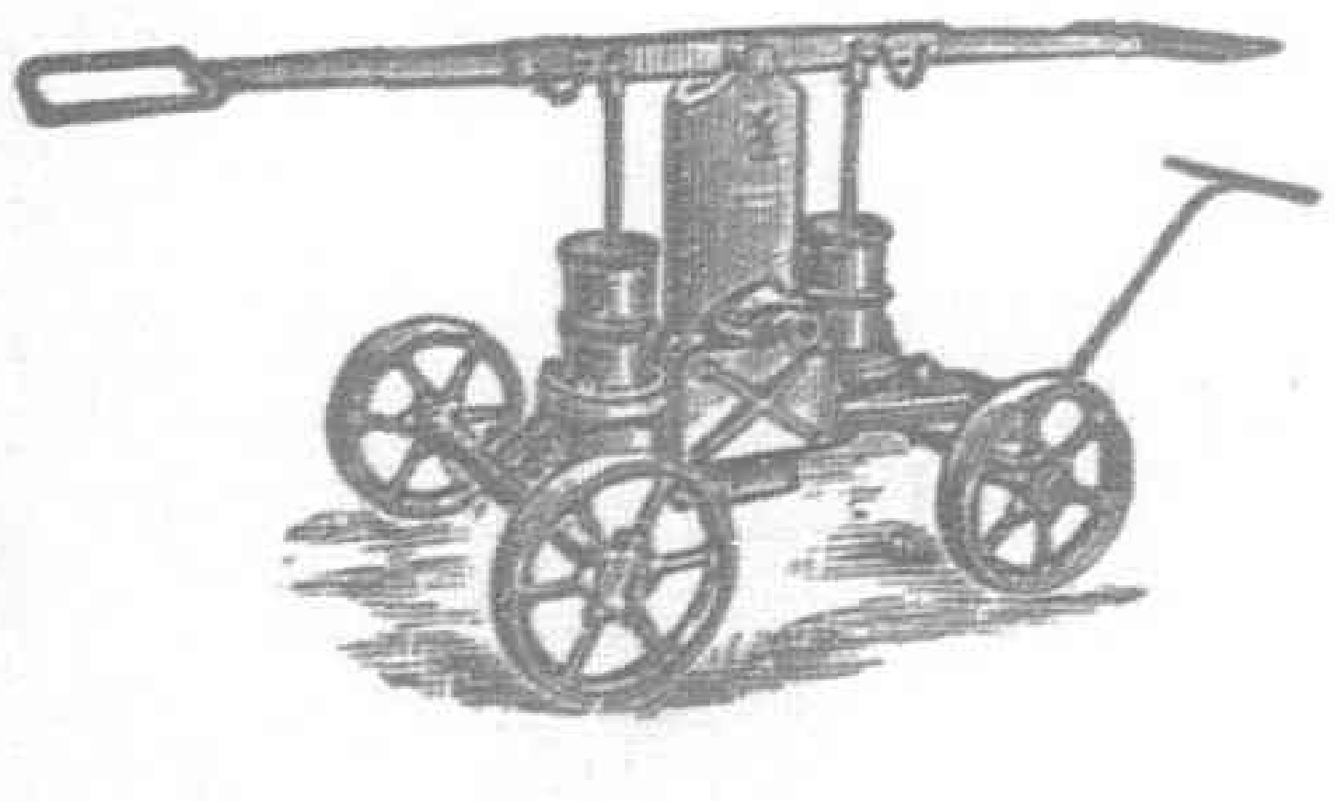
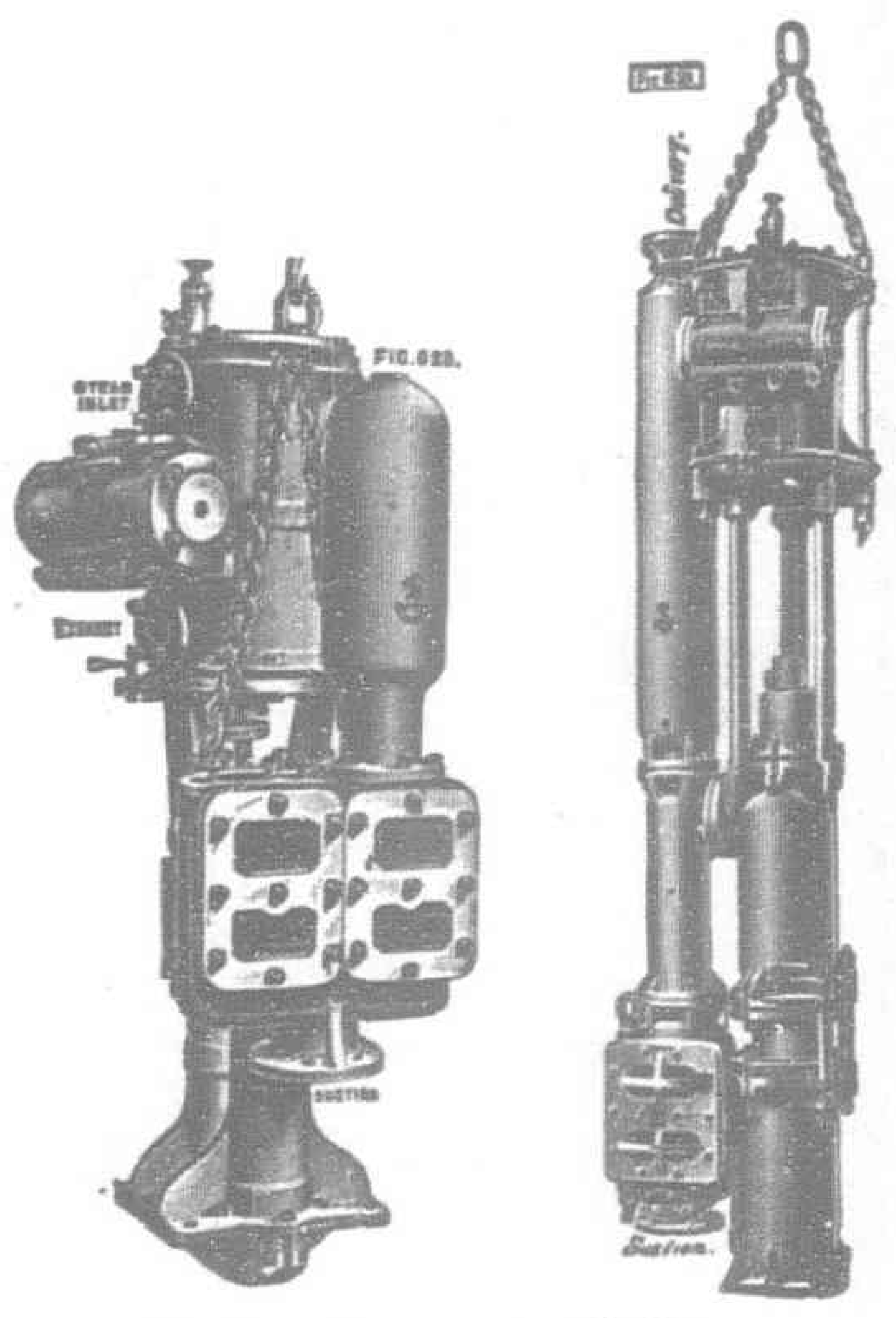


FIG.223.

FIG.160C.





Sinking Pumps for Collieries, Mines, Etc.

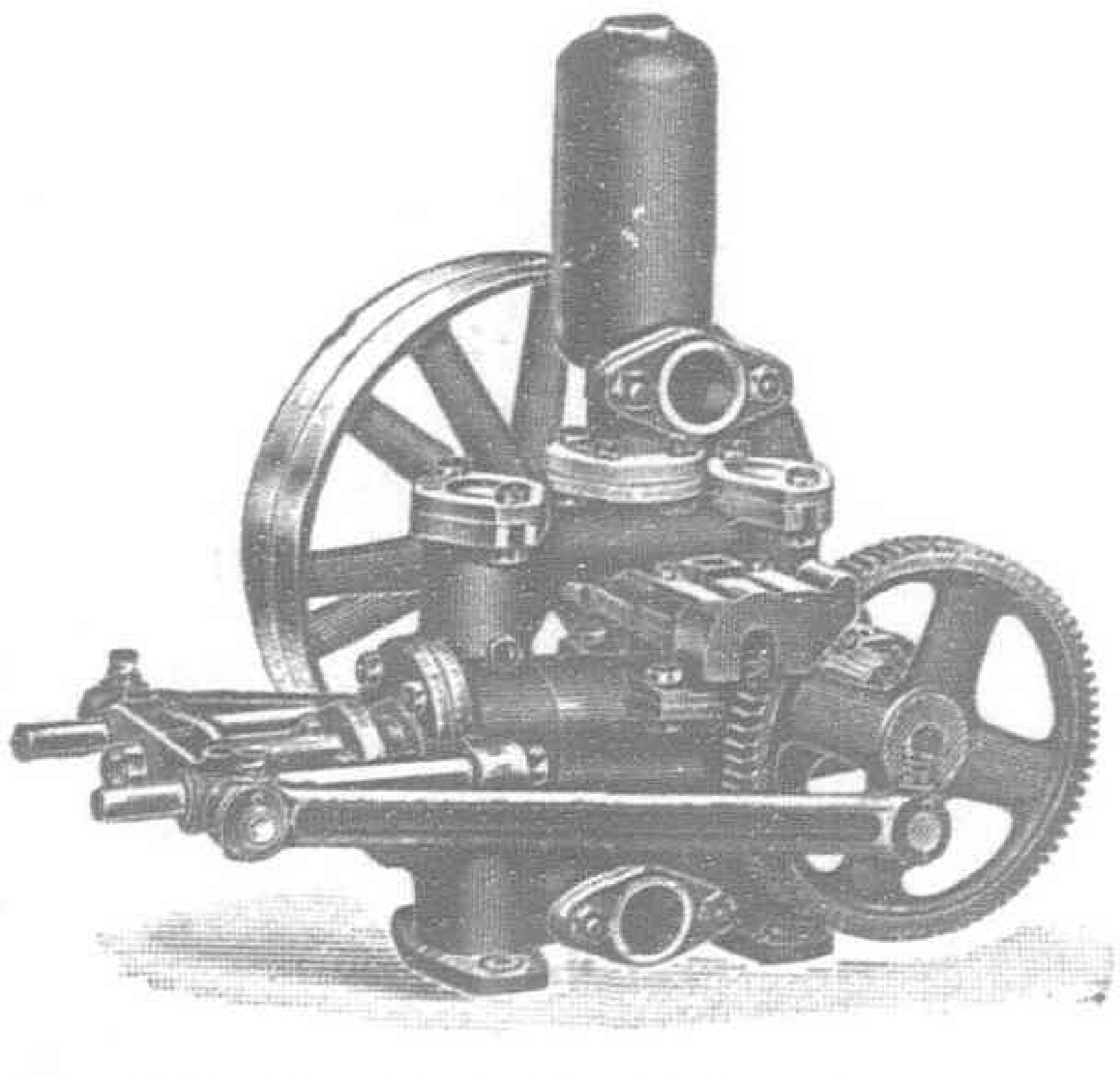


Fig. 831—Double Acting Belt Driven Pump

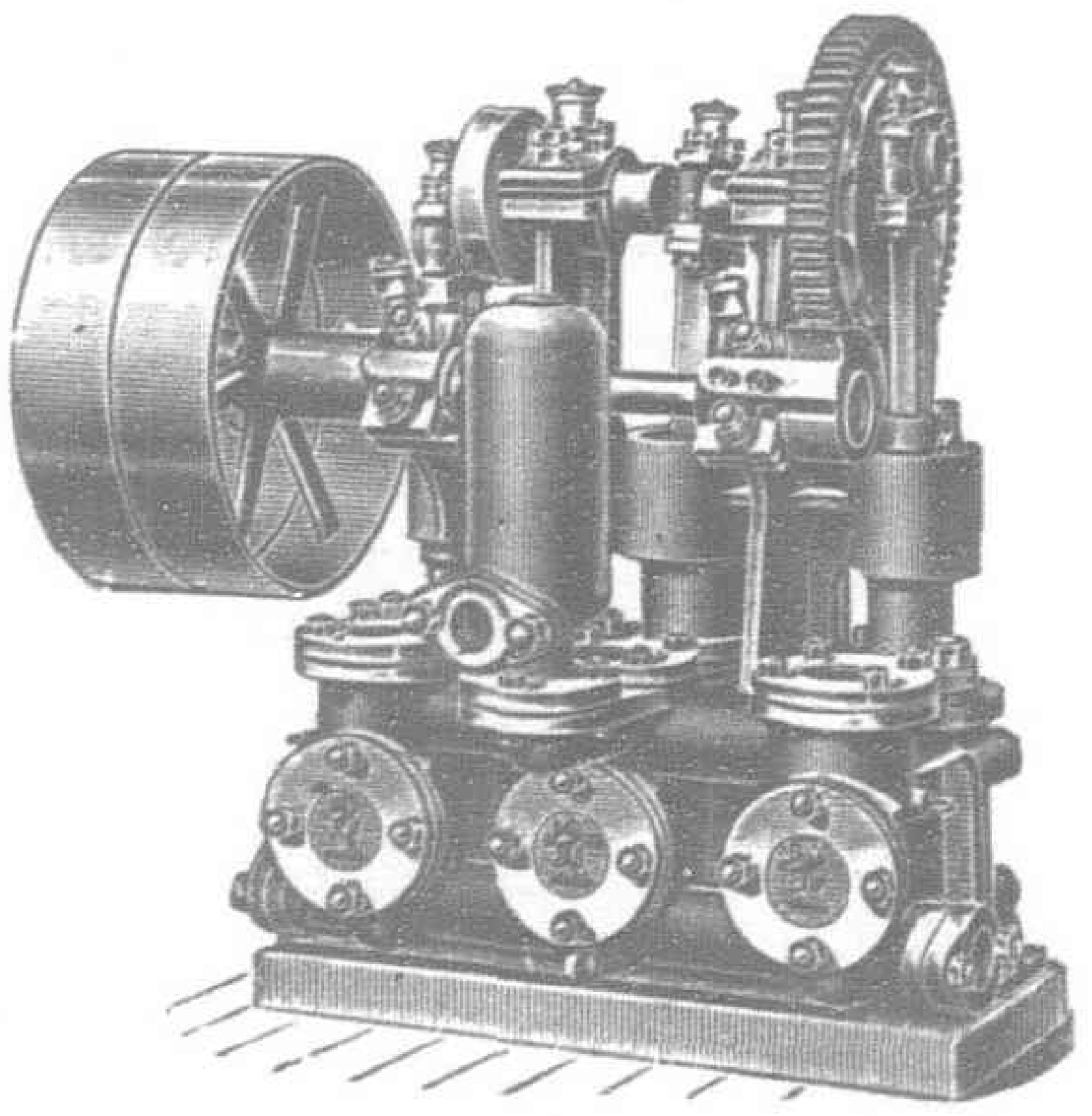


Fig. 842—Treble Ram Pump for Belt or Electric Drive

FIG.191.

Write for "Eastern" List.

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CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

FIG.185.

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JAPANESE

TEXTILES FOR EXPORT

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Established 1889.

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Reserve & Brought For'd. -	**Y. 46,017,000**

MANUFACTURERS

of

All Sorts of Cotton Yarns and Cloths, Raw Silks and Spun Silks

Head Office

3-chome, Bingo-machi, Higashi-ku,
OSAKA.

President

Dr. K. KIKUCHI.

Factories:

Fifteen Mills at Home and
Two Mills in China

Number of Spindles:	Cotton Yarn	993,700
	Silk Yarn	47,500
Number of Weaving Machines:		9,100

NAIGAI WATA KABUSHIKI KAISHA

Established 1887.

Capital - - - - - - -	**Y. 16,000,000**
Capital Paid-Up - - -	**Y. 13,250,000**
Reserve - - - - - - -	**Y. 14,343,206.31**

MANUFACTURERS

OF

COTTON YARN & CLOTH

Head Office

Dojima-kitamachi, Kitaku, OSAKA.

Factories in China:

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Number of Spindles:	Spinning	398,176
	Twisting	32,340
Number of Weaving Machines:		2,500

JAPANESE

TEXTILES FOR EXPORT

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Manufacturers of

COTTON YARN; SHEETINGS, SHIRTINGS,
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President: FUSAJIRO ABE

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ESTABLISHED 1900

Capital	**Yen 18,750,000**
Capital paid-up	**Yen 14,062,500**
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Manufacturers of

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and OTHER COTTON CLOTHS.

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President: F. TANIGUCHI.

FACTORIES: Eight Mills in Japan.

Number of Spindles:	**Spinning**	**332,480**
	Twisting	**57,176**
Number of Weaving Machines		**3,198**

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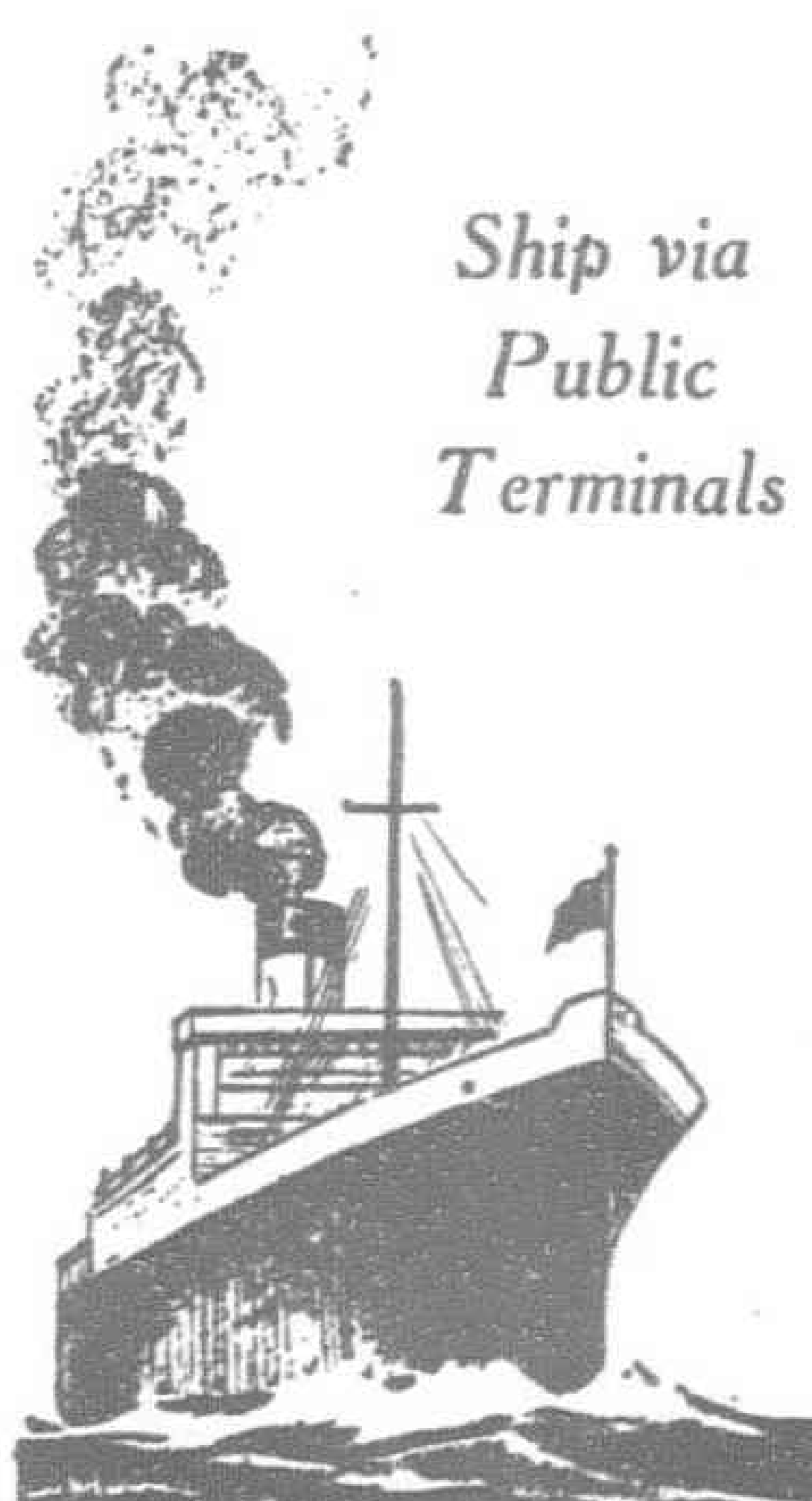

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NO EFFORT has been spared in protecting the Port of Seattle terminals against fire. Automatic sprinkler and fire alarm systems, fire extinguishers, chemicals and hose reels, fire walls form an effective safeguard. Watchmen make rounds at regular intervals —in fact every modern fire protection method is employed to make the terminals safe.

This protection reduces shippers' insurance rates to a minimum.

Insure Safety, Economy and Dispatch by Shipping via Port of Seattle.

Write for copy of the Port of Seattle Yearbook—it contains much information and data valuable to traffic managers, manufacturers, exporters, importers, and others interested in trading with the Orient. It's free for the asking.

Traffic Department, Bell St. Terminal
Seattle, Washington

The PORT OF SEATTLE
GATEWAY TO AMERICAN MARKETS

ELESCO

The Greatest Capacity-increasing Factors on the Modern Locomotive

Regardless of locomotive size or class the Elesco superheater and the Elesco feed water heater together add at least 35 per cent. to the sustained boiler capacity of that locomotive.

This added capacity makes possible the high speeds and heavy trains of modern railroad operation.

Elesco-equipped locomotives make every ton of fuel, every dollar of wages and every dollar of investment yield more in net earnings.

THE SUPERHEATER COMPANY

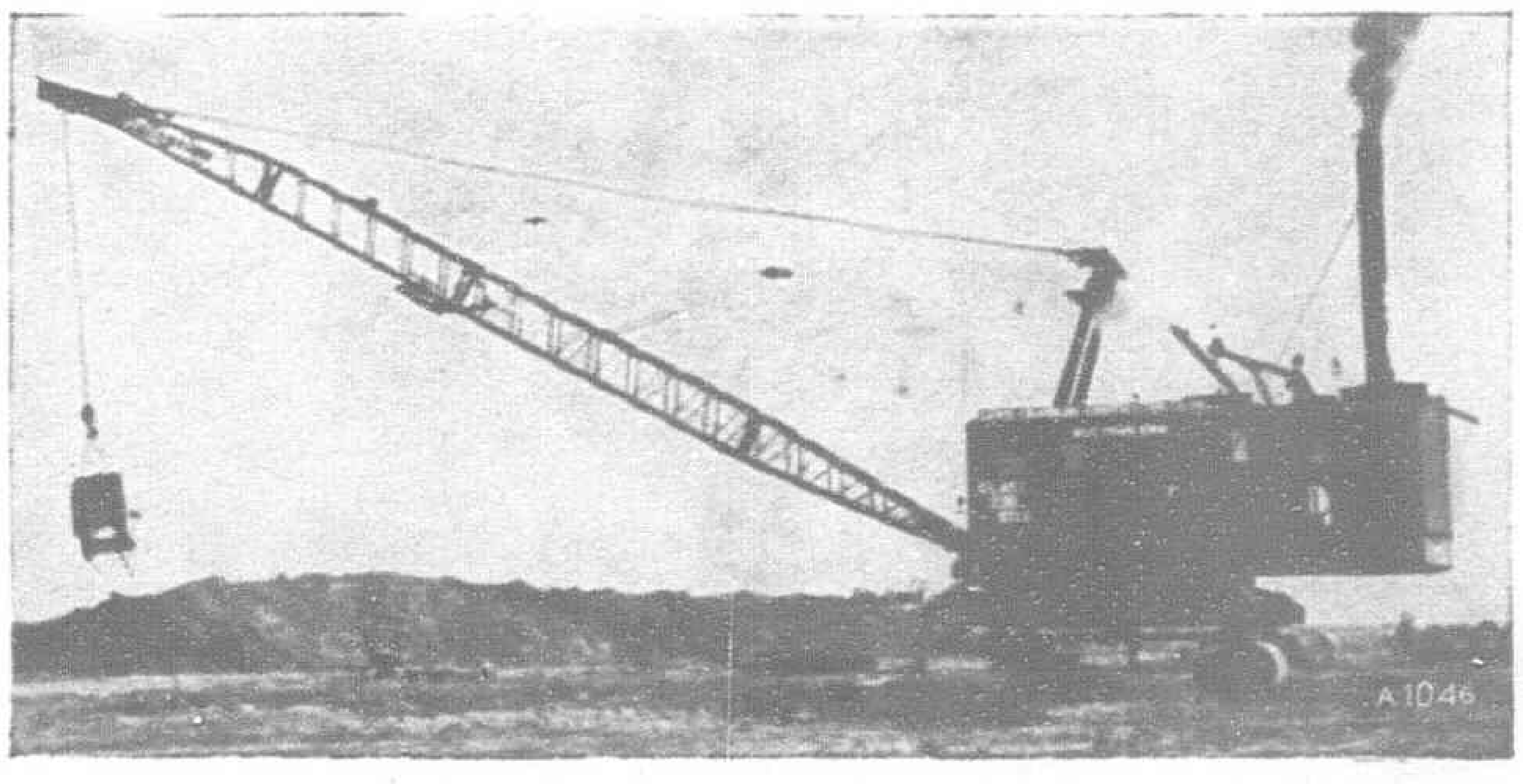
17 East 42nd Street,
New York City, N.Y., U.S.A.

Peoples' Gas Building,
Chicago, Ill., U.S.A.

***Eastern Representative:* George E. Spengler,**
1 Ting Yin Hutung, Peiping, North China

Designing Engineers and Manufacturers of Elesco Steam Superheaters for Locomotive, Marine and Stationary Services, Locomotive Feed Water Heaters, Locomotive Exhaust Steam Injectors and Pipe Coils

A-293



A Special Excavator for Special Conditions

The Class 230—6-yard Dragline

After 12 years of continuous operation, during which time numerous improvements have been made and design and reliability thoroughly tried, Bucyrus-Erie Company now offers the long-range, Class 230 dragline as the only machine specially developed to meet the present day large production, low-cost requirements where operations must be handled over soft and swampy ground.

With standard equipment of 150 foot boom and 6-yard bucket, the Class 230 can be equipped with steam (coal burning or oil burning), Diesel-electric or electric power.

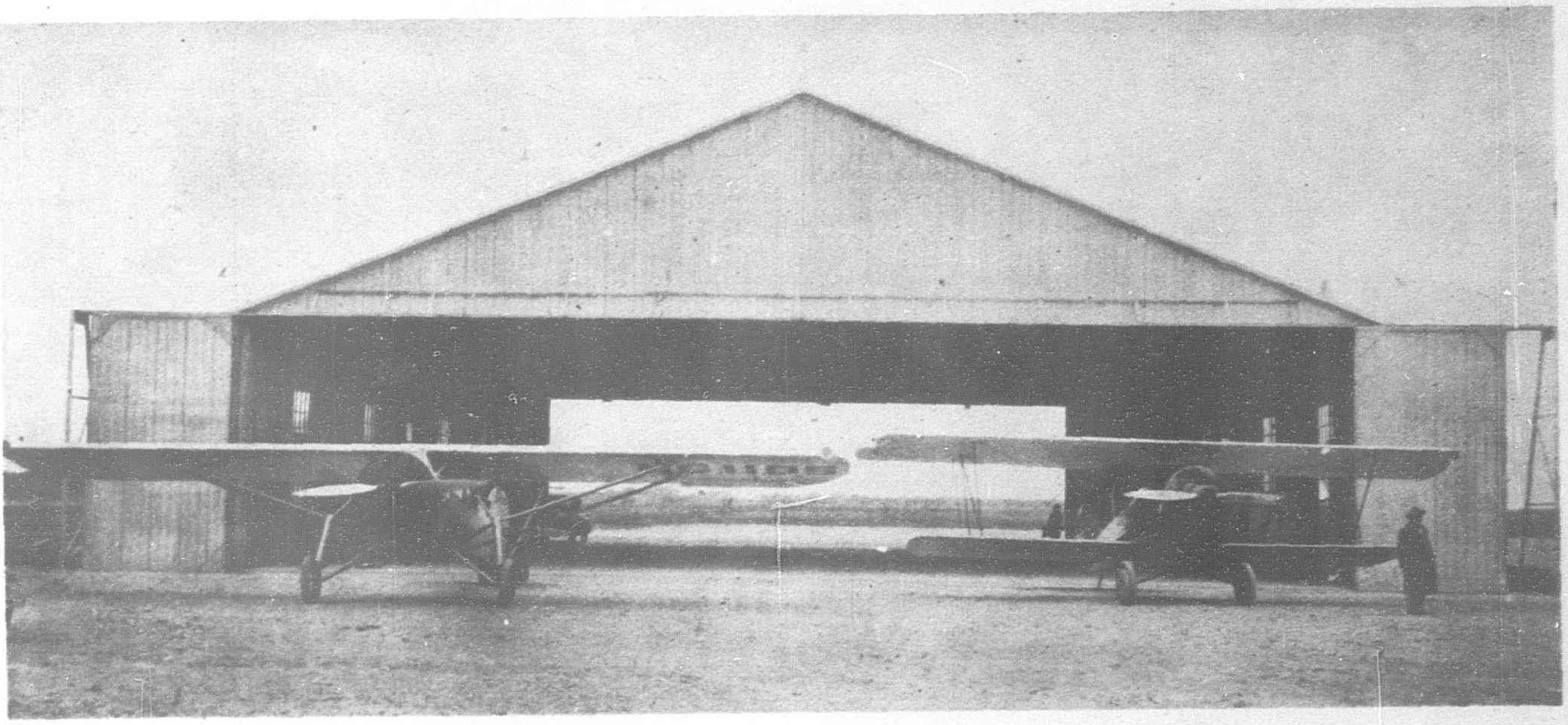
Although a light machine, the Class 230 has all the sturdy reliability for which Bucyrus-Eries have become famous the world over.

BUCYRUS ERIE
Trade Mark Registered

BUCYRUS-ERIE COMPANY

Head Office: South Milwaukee, Wis., U.S.A.
London Office: Bucyrus-Erie Co., Ltd., Windsor House, 83, Kings-way London, W.C.2. England.

INDIA, McLeod & Co., Calcutta; SIAM, The Borneo Co., Ltd., Bangkok; JAPAN, Mitsui & Co., Ltd., Tokyo and principal cities of Japan; BURMA, William Jacks & Co., 75 Merchant Street, Rangoon; STRAITS SETTLEMENTS, Kyle, Palmer & Co., Ltd., 70 Cecil Street, Singapore; FEDERATED MALAY STATES, *Southern*, Kyle, Palmer & Co., Ltd., Kuala Lumpur, *Northern*; Aylesbury & Nutter, Ltd., Ipoh, Perak.



Airplane hangars of this type, as well as several other types, and other standard metal buildings are manufactured by the International Derrick and Equipment Company, Columbus, Ohio.

Armco Ingot Galvanized Iron Sheets are used for roofing and siding for rust resisting and long service life.

Full Particulars and prices apply to sole agents for China.

American Trading Company,

of the Far East, Inc.

Head Office for China: 3 CANTON ROAD, Shanghai

Cable Address: "AMTRACO" P.O. Box 233

110 Rue de France, Tientsin

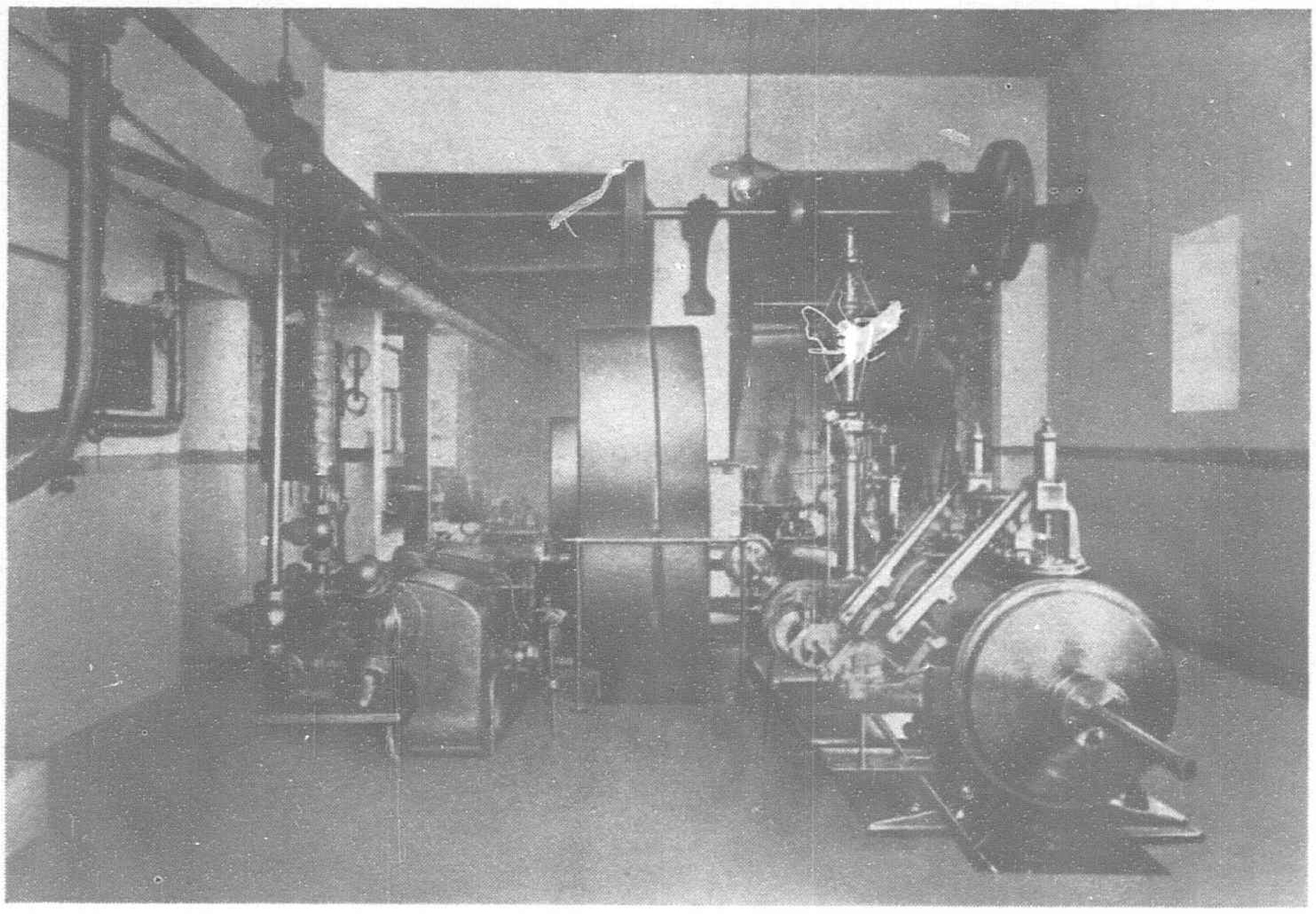
Japan Offices: TOKYO and KOBE

Sulzer

瑞士國温德多蘇爾壽兄弟機器公司

駐華上海工程事務所愛多亞路四號

Refrigerating Plant



Sulzer Ammonia Compressor, rated capacity 280,000 B. T. U's per hour, direct coupled to a Sulzer Steam Engine

AS BUILT IN

1878

Still in service today in the Glacière de Narbonne, France

Several thousand Sulzer Refrigerating Plants have been installed in meat freezing establishments, slaughter houses, cold stores, chemical works, breweries, butchers'shops, hotels, etc.

SULZER BROTHERS, LIMITED, WINTERTHUR (SWITZERLAND)

SHANGHAI:
SULZER BROTHERS
Engineering Office - 4 Avenue Edward VII

KOBE:
SULZER BROTHERS
Engineering Office - 72 Kyo-Machi,

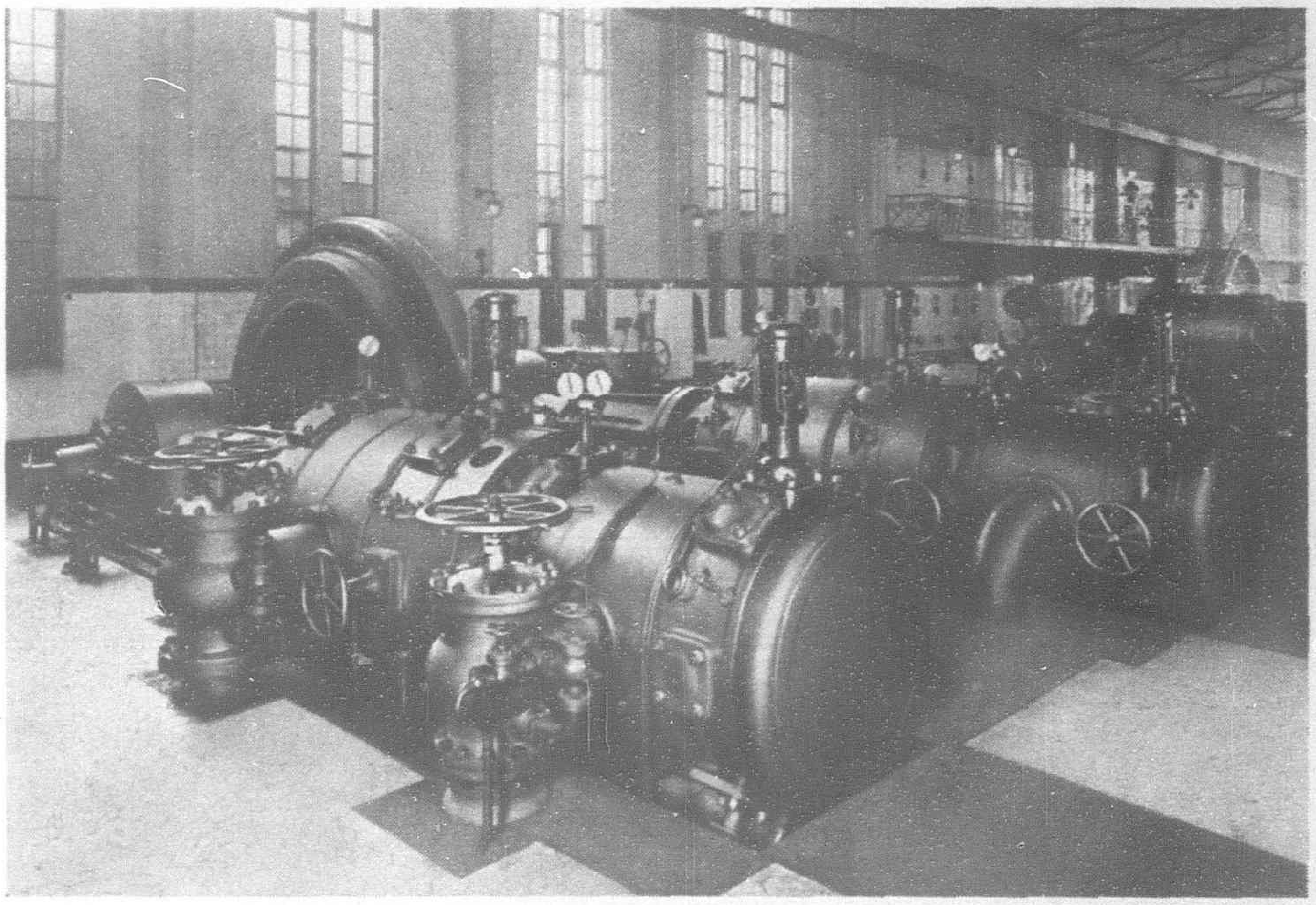
21294

Sulzer

瑞士國溫德多
蘇爾壽兄弟機器公司

駐華上海工程事務所
愛多亞路四號

Refrigerating Plant



Sulzer Comp. Ammonia Compressor, rated capacity 32,000,000 B. T. U's per hour, driven by 2200 BHP direct coupled flywheel type electric motor

AS BUILT IN

1928

The Largest Set in existence. Installed in a chemical works in Germany

Other specialities: Steam Engines, Steam Boilers, High-Pressure Compressors, Diesel Engines, Centrifugal Pumps, Fans, Central Heating and Ventilating Installations

SULZER BROTHERS, LIMITED, WINTERTHUR (SWITZERLAND)

SHANGHAI:
SULZER BROTHERS
Engineering Office - 4 Avenue Edward VII

KOBE:
SULZER BROTHERS
Engineering Office - 72 Kyo-Machi.

21295

Chartered Bank of India, Australia and China

(INCORPORATED IN ENGLAND BY ROYAL CHARTER, 1853)

Capital £3,000,000
Reserve Fund £4,000,000

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Bankers:

THE BANK OF ENGLAND.
MIDLAND BANK, LTD.
WESTMINSTER BANK, LTD.
NATIONAL PROVINCIAL BANK, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah)
Amritsar
Bangkok
Batavia
Bombay
Calcutta
Canton
Cawnpore
Cebu
Colombo
Dairen (Manchuria)
Delhi
Haiphong
Hamburg
Hankow
Harbin
Hongkong
Iloilo
Ipoh
Karachi
Klang
Kobe
KualaKangsar (Perak)
Kuala-Lumpur (F.M.S.)
Kuching (Sarawak)
Madras
Manila
Medan
New York
Peking
Penang
Peshawar
Rangoon
Saigon
Semarang
Seremban
Shanghai
Singapore
Sourabaya
Taiping (F.M.S.)
Tavoy (L. Burma)
Tientsin
Tokyo
Tongkah (Bhuket)
Tsingtao
Yokohama
Zamboanga

Drafts granted on the above Agencies and Branches and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking business undertaken.

F. P. WEST,
Manager.

ATTWATER & SONS

ESTABLISHED 1868
Hopwood Street Mills, PRESTON, ENGLAND

MICA and MICANITE

IN ALL FORMS AND QUALITIES.

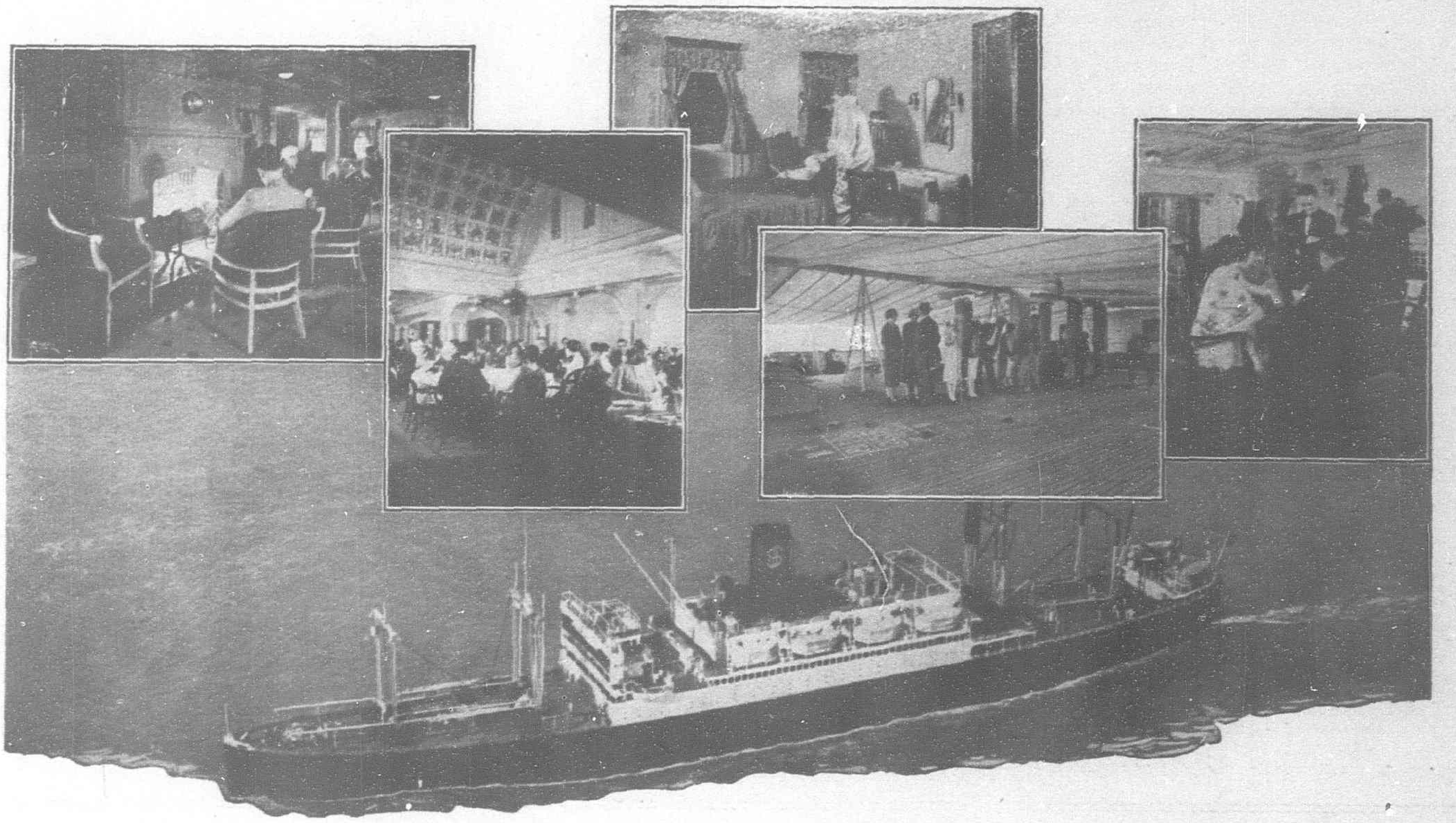
BAKELITE SHEETS, TUBES, BOBBINS, VARNISH and RESIN for OIL SWITCH GEAR and TRANSFORMERS. VULCANISED FIBRE, SHEETS, TUBES and RODS. PEERLESS LEATHEROID INSULATION EMPIRE CLOTH and TAPES. COTTON and also ASBESTOS DYNAMO TAPES.

PRESSPAHN AND FULLERBOARD IN SHEET AND ROLLS

WHILE I LIVE I'LL CROW
REGD TRADE MARK

EBONITE AND ALL INSULATING MATERIAL FOR ELECTRICAL ENGINEERS

ABOARD PRESIDENT LINERS



TRAVEL IS INDEED A PLEASURE

Aboard the luxurious PRESIDENT LINERS. Commodious outside staterooms equipped with beds, electric fans, thermos bottles and other modern conveniences, together with a world-famous cuisine featuring American grown fruits and green vegetables add greatly to the enjoyment of your voyage. Running hot and cold water is available in all staterooms.

Weekly Service Across the Pacific

To SAN FRANCISCO and LOS ANGELES *via* Honolulu, fortnightly
To SEATTLE *via* Victoria, fortnightly.

Fortnightly Service Round the World

To EUROPE and NEW YORK *via* Manila, Straits Settlements, Ceylon, Egypt and the Mediterranean.

DOLLAR STEAMSHIP LINE
AMERICAN MAIL LINE

THE ROBERT DOLLAR CO., *General Agents*

Branch Offices in all the Principal Ports of the Far East and Round the World.

SUGAR

Softs
Cubes
Cuts
Powdered

TRADE S MARK

Granulated
Plantation
Centrifugals

THE JAPAN SUGAR M.F.G. Co., Ltd.

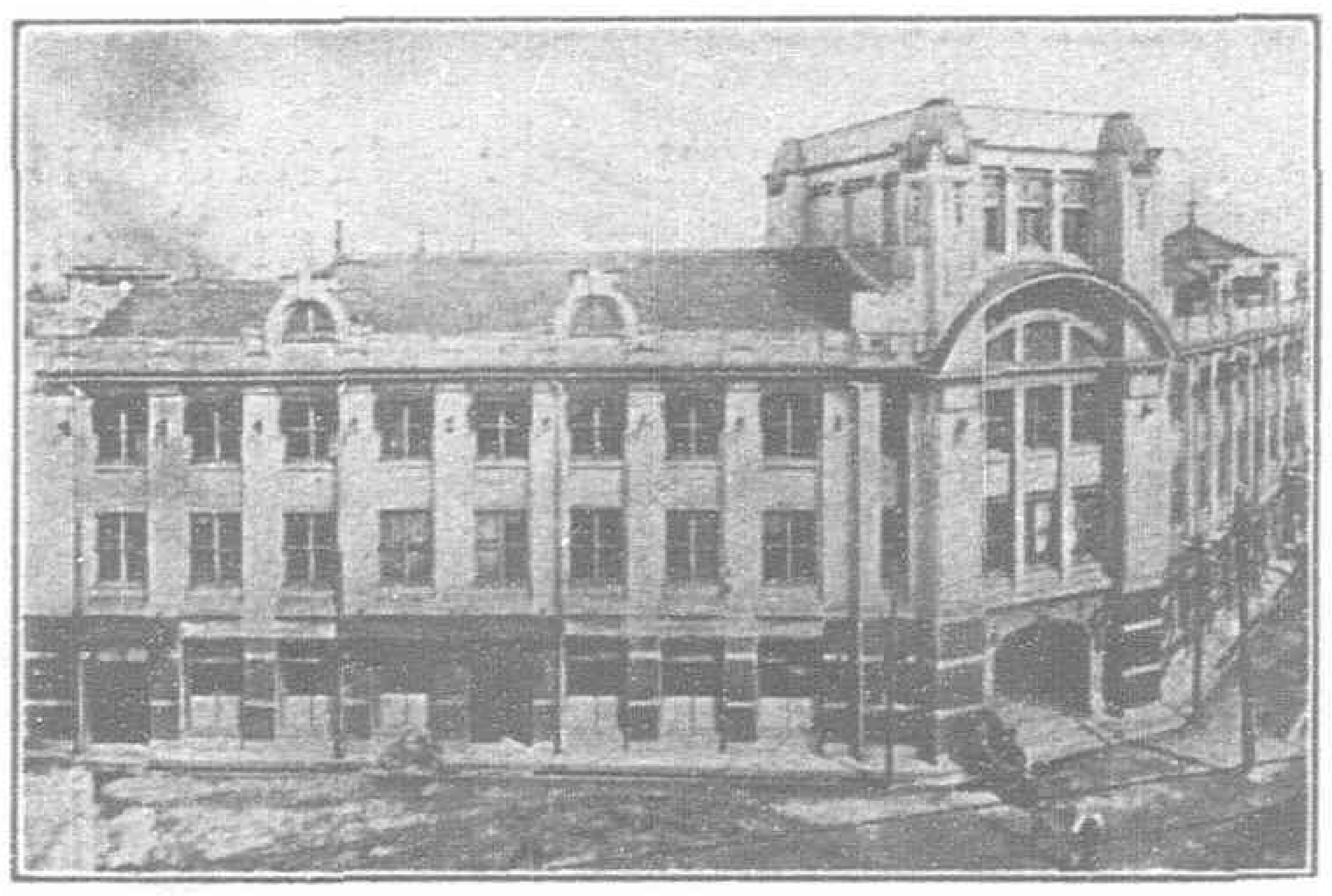
(Dai Nippon Seito Kabushiki Kaisha)

ESTABLISHED 1896

Raita Fujuyama, *President*

Authorized Capital	Y.51,416,600.
Paid-up Capital	Y.34,749,100.
Reserve Fund	Y.17,621,700.

Head Office: Showa Building, Marunouchi, Tokyo, Japan.
Cable Address: " Sugar " Tokyo.
Codes Used: A.B.C. 6th Edition and Bentley's.
Branches: Osaka, Nagoya, Keijo, Shanghai and Soerabaja.
Factories: Tokyo, Osaka, Moji, Korea, Formosa, Java and Daitojima.



General Office Building of Ujigawa Electric Power Co., Ltd., Osaka, Japan.

Ujigawa Electric Power Co., Ltd.

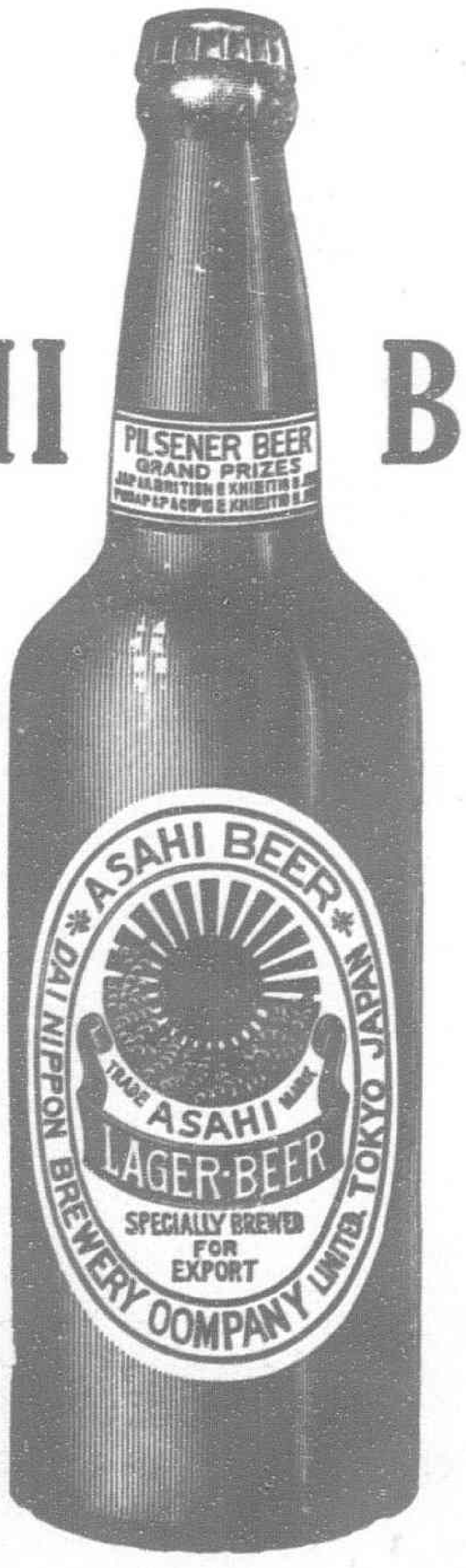
Osaka, Japan.

Authorized Capital Yen 85,000,000.00

Yasushige Hayashi, *President and Director*
Senzaburo Kageyama, *Managing Director*

17 Power houses (erected) with a total capacity of	111,700 K.W.
4 Power houses (under construction) with a total capacity of	31,600 K.W.
9 Power houses (permit obtained) with a total capacity of	83,400 K.W.
15 Power houses (permit applied) with a total capacity of	36,200 K.W.
Grand Total	262,900 K.W.
Power supplied	267.021 H.P.
Its Customers	14,568
Electric Lights	319,186
Its Customers	146,040
Purchased Power	100,100 K.W.

ASAHI BEER


PILSENER BEER
GRAND PRIZES
ASAHI BEER
DAI NIPPON BREWERY COMPANY LIMITED, TOKYO JAPAN
TRADE ASAHI MARK
LAGER-BEER
SPECIALLY BREWED FOR EXPORT

The National City Bank
of New York

1-A KIUKIANG ROAD, SHANGHAI

Head Office :
55 WALL STREET, NEW YORK, U.S.A.

CAPITAL, SURPLUS AND UNDIVIDED PROFITS
Over U.S. $235,000,000

Branches and Affiliates :

ARGENTINE
BELGIUM
BRAZIL
CHILE
CHINA
COLOMBIA
CUBA
DOMINICAN REPUBLIC
ENGLAND
FRANCE
HAITI
INDIA
ITALY
JAPAN
MEXICO
PERU
PHILIPPINE ISLANDS
PORTO RICO
REPUBLIC OF PANAMA
SPAIN
STRAITS SETTLEMENTS
URUGUAY
VENEZUELA

The Bank of Chosen

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor: K. Nonaka, Esq.
Deputy-Governor: S. Suzuki, Esq.

Directors:

Y. Katayama, Esq. M. Hashimoto, Esq
I. Iuchi, Esq. T. Kakiuchi, Esq.

Head Office: SEOUL (Korea)

FOREIGN DEPARTMENT (TOKYO)

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branch Offices:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chungjin
Manchuria—Antung, Mukden, New Town (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostok, Alexandrofsky Port

NEW YORK AGENCY:

G. Benenson Investing Building, 165 Broadway,
New York City

LONDON REPRESENTATIVE:

Palmerston House, 34 Old Broad Street,
London, E.C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in Other Commercial Centers throughout the World

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Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

Capital Subscribed - - - Yen 50,000,000

Head Office: 7 Eiraku-cho, Nichome, Marunouchi, Tokyo.
Cables: "Kogin," Tokyo

BRANCHES:

Tokyo: Nihonbashi *Osaka:* Koraibashi
Kobe: Nakamachi

SHIMAKICHI SUZUKI, Esq., *President*

DIRECTORS:

Kozo Matsumoto, Esq. Ichimatsu Horai, Esq.
Keikichi Amanoya, Esq.

AUDITORS:

Takahide Yoshikawa, Esq. Teizo Iwasa, Esq.
Viscount Takamasa Hachijo

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

Business Transacted:

1.—Loans on the security of public bonds, of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

Hongkong and Shanghai Banking Corporation

(INCORPORATED IN HONGKONG)

Capital: Authorised Capital $50,000,000
Issued and fully paid up ... $20,000,000

Reserve Funds: Sterling £6,000,000
Silver $14,000,000
Reserve Liability of Proprietors $20,000,000

Court of Directors

W. H. BELL, Esq. Chairman
J. A. PLUMMER, Esq. Deputy Chairman
B. D. F. BEITH, Esq.
A. H. COMPTON, Esq.
M. T. JOHNSON, Esq.
B. LANDER LEWIS, Esq.
W. L. PATTENDEN, Esq.
T. E. PEARCE, Esq.
T. H. R. SHAW, Esq.
J. P. WARREN, Esq.

Head Office:
HONGKONG

Chief Manager:
Hon. Mr. A. C. HYNES, Hongkong.

London Bankers:
THE WESTMINSTER BANK, LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 27 Broadway

Branches and Agencies:

AMOY
BANGKOK
BATAVIA
BOMBAY
CALCUTTA
CANTON
CHEFOO
COLOMBO
DAIREN
FOOCHOW
HAIPHONG
HAMBURG
HANKOW
HARBIN
ILOILO
IPOH
JOHORE
KOBE
KOWLOON (Hongkong)
KUALA LUMPUR
LONDON
LYONS
MALACCA
MANILA
MOUKDEN
MUAR(Johore)
NAGASAKI
NEW YORK
PEIPING
PENANG
RANGOON
SAIGON
S. FRANCISCO
SHANGHAI
SINGAPORE
SOURABAYA
SUNGEI PATANI
TIENTSIN
TOKYO
TSINGTAO
YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America. Safe Deposit Boxes to rent. Terms on application.

SAVINGS BANK OFFICE

Accounts will be kept either in Dollars or Taels, Local Currency, at the option of the Depositor.
Deposits of less than $1 or Tl. 1 will not be received.
Not more than $200 or Tls. 200 will be received during one month from any single Depositor.
Interest at the rate of 3½% per annum will be allowed upon the monthly minimum balance.
The maximum balance on which interest will be allowed is $5,000 or Tls. 5,000.
Deposits may be withdrawn on Demand.
Depositors will be provided with Pass Books in which all transactions will be entered. Pass Books must be presented when paying in or withdrawing money.

Office Hours—10 a.m. to 3 p.m. Saturdays 10 a.m. to Noon.

A. B. LOWSON, *Manager.*

The Kawasaki-One Hundredth Bank, Ltd.

HEAD OFFICE: YOROZU-CHO, TOKYO

Phone: Nihombashi 141, 3105

SHO HOSHINO, *President*

Special facilities offered for foreign residents and corporations in Japan
Interest allowed on current and time deposits. Safe deposit box rented

BRANCHES AND AGENCIES:

Yokohama, Kobe, Kyoto, Osaka and 78 others in principal cities in Japan

CAPITAL PAID YEN 150,000,000

SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF COPPER MINES, SILVER AND GOLD MINES AND COAL MINES, ETC.

OFFICES AND DEPARTMENTS

Mining Offices	Kohnomai & Ohgayu
Forestry Department	Osaka
Sales Departments	Osaka, Tokyo, Yokosuka, Nagoya, Kobe, Kure, Hakata and Shanghai

The Sumitomo Steel Works, Limited
OSAKA, JAPAN
Capital Subscribed: Yen 12,000,000

The Sumitomo Electric Wire & Cable Works, Ltd.
OSAKA, JAPAN
Capital Subscribed: Yen 10,000,000

The Sumitomo Steel Tube & Copper Works, Ltd.
OSAKA, JAPAN
Capital Subscribed: Yen 15,000,000

The Sumitomo Fertilizer Works, Limited
Capital Subscribed: Yen 3,000,000
Head Office: Osaka, Japan Works: Niihama, Iyo, Japan

The Sumitomo Besshi Mine, Limited
Capital Paid: Yen 15,000,000
Head Office: Niihama, Iyo, Japan Branch: Osaka, Japan

The Sumitomo Warehouse Company, Limited
Capital Paid: Yen 15,000,000
Head Office: Osaka, Japan Branches: Osaka, Kobe & Tokyo

The Sumitomo Trust Company, Limited
Capital Subscribed: Yen 20,000,000
Head Office: Osaka, Japan Branches: Tokyo & Fukuoka, Japan
Authorized to Exercise all Trust Powers for Individuals and Corporations.

The Sumitomo Life Insurance Company, Limited
OSAKA, JAPAN
Capital Subscribed: Yen 1,500,000

The Sumitomo Kyushu Colliery Company, Limited
WAKAMATSU, CHIKUZEN, JAPAN
Capital Subscribed: Yen 10,000,000

The Sumitomo & Ban Colliery Company, Limited
SAPPORO, JAPAN
Capital Subscribed: Yen 7,000,000

ESTABLISHED: 1895 INCORPORATED: 1912

THE SUMITOMO BANK, LTD.

KITAHAMA, OSAKA, JAPAN

Subscribed Capital	Yen 70,000,000
Paid-up Capital	Yen 50,000,000
Reserve Funds	Yen 28,180,000

DIRECTORS:

K. YUKAWA, Esq.	Chairman of Board of Directors
N. YATSUSHIRO, Esq.	Chief Managing Director
K. KAGA, Esq.	Managing Director
K. OHDAIRA, Esq.	,, ,,
BARON K. SUMITOMO	Director
K. HORI, Esq.	,,
S. IMAMURA, Esq.	,,
S. KOH, Esq.	,,
H. OKAHASHI, Esq.	,,

Home Branches: Osaka (27), Tokyo (16), Yokohama, Nagoya (2), Kyoto (3), Kobe (3), Okayama, Onomichi, Niihama, Kure, Hiroshima (3), Yanai, Shimonoseki, Moji, Kokura, Wakamatsu, Fukuoka (2), Kurume (2), Kumamoto.

Foreign Branches: London, New York, San Francisco, Los Angeles, Bombay, Shanghai and Hankow.

Affiliated Banks: The Sumitomo Bank of Hawaii, Limited, Honolulu. The Sumitomo Bank of Seattle, Seattle. The Sumitomo Bank of California, Sacramento, Cal.

Bankers: Lloyds Bank, Limited, London. National City Bank of New York, New York. Lloyds and National Provincial Foreign Bank, Limited, Paris.

Correspondents: Established in all important places at home and abroad.

The Bank Buys, sells and receives for collection Drafts and Telegraphic Transfers; issues Commercial and Travellers' Letters of Credit available in all important parts of the World, and acts as Trustee for Mortgage Bond, besides doing General Banking Business.

THE

MITSUBISHI
BANK,

LIMITED

CAPITAL - - - - - - Yen 100,000,000
RESERVE FUND - - - Yen 41,460,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Kiyoshi Sejimo Mr. Takeo Kato
Mr. Sobun Yamamuro

HEAD OFFICE:

No. 5, Marunouchi, Nichome, Kojimachi-ku,
Tokyo.

BRANCHES HOME:

Eitaibashi (Tokyo), Tokio Kaijo Building (Tokyo), Marunouchi Building (Tokyo), Nihombashi (Tokyo), Yotsuya (Tokyo), Komagome (Tokyo), Nihombashi-Toricho (Tokyo), Kanda (Tokyo), Shinagawa (Tokyo), Omori (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Nishinagahori (Osaka), Kobe, Sannomiya (Kobe), Kyoto, Nagoya, Otaru.

BRANCHES OVERSEAS:

Shanghai Office: No. 2, Kiukiang Road, Shanghai.
London Office: No. 3, Birchin Lane, Cornhill, London, E.C.3.
New York Office: No. 120, Broadway, New York.

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673

Capital Subscribed............... Y. 100,000,000
Capital Paid-Up.................... Y. 60,000,000
Reserve Funds........................ Y. 64,700,000

HEAD OFFICE: TOKYO
No. 1 Surugacho, Nihonbashi-ku

Home Branches:

FUKUOKA, HIROSHIMA, KOBE, KYOTO, MARUNOUCHI (Tokyo), MOJI, NAGASAKI, NAGOYA, NIHONBASHI (Tokyo), OSAKA, OSAKA - DOJIMA, OSAKA - KAWAGUCHI, OSAKA - NISHI, OTARU, SHIMONOSEKI, WAKAMATSU (Kyushu), YOKOHAMA.

Foreign Branches:

Bombay, London, New York, Shanghai, Sourabaya.

London Bankers:

Barclays Bank, Ltd. Midland Bank, Ltd.

New York Bankers:

Bankers Trust Co. Chase National Bank.
National City Bank of New York.

BANK OF CHINA

RE-ORGANIZED OCTOBER 26, 1928, UNDER SPECIAL CHARTER OF THE NATIONAL GOVERNMENT AS AN

INTERNATIONAL EXCHANGE BANK

Paid-Up Capital, $25,000,000

Head Office, 22 The Bund, Shanghai

Under its new Charter, the Bank of China is Privileged to Issue Banknotes and to act as a Government Depository. As the Official International Exchange Bank, we Take Pleasure in Announcing that we are now in a Unique Position to Promote and Foster the Ever-Growing Foreign Trade of New China. With our numerous Branches and Sub-Branches throughout China and Correspondents in most of the Important Commercial Cities of the World, we are able to extend to our Clients Banking and Exchange Facilities Indispensable for the Development of Trade on a Large Scale.

Every Description of Banking Business Transacted: Interest Allowed on Current Accounts and Fixed Deposits

Chairman of the Board: LI MING
General Manager: CHANG KIA-NGAU
Manager, Shanghai Branch: TSUYEE PEI.

THE BANK OF TAIWAN, LTD.

Incorporated By
Special Imperial Charter 1899

Shanghai Branch:

No. 16 The Bund
S. Kondo, Manager
Telephones:—Central 1331 (Manager's Office),
8796 to 8800 (Private Exchange to all Departments),
2814 (Compradore's office).

Branches and Agencies:

Japan: Tokyo (Central Office), Kobe, Osaka and Yokohama.
Formosa: Giran, Heito, Kagi, Karenko, Keelung, Makong, Nanto, Shinchiku, Taichu, Tainan, Takao, Taito, Tamsui and Toen.
China: Amoy, Canton, Foochow, Hankow, Shanghai and Swatow.
Java: Batavia, Samarang and Soerabaia.
India: Bombay and Calcutta.
Others: Hongkong, London, New York and Singapore.

London Bankers:

Barclays Bank, Ltd. Lloyds Bank, Ltd.
Midland Bank, Ltd. Westminster Bank, Ltd.

Correspondents at all the principal cities of the world.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)
ESTABLISHED 1873

Capital (Paid Up)	**Yen 57,500,000.00**
Reserve Fund	**Yen 57,500,000.00**
Special Reserve Fund	**Yen 6,300,000.00**

Y. SASAKI, *President*
K. ISHII, *Vice-President*
S. SUGITA, T. AKASHI, *Managing Director.*
Y. OHSAWA, *Managing Director.*

HEAD OFFICE:
No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.
T. AKASHI, *Manager* T. INOUYE, *Sub-Manager* S. SASAKI, *Sub-Manager*

CITY BRANCHES:
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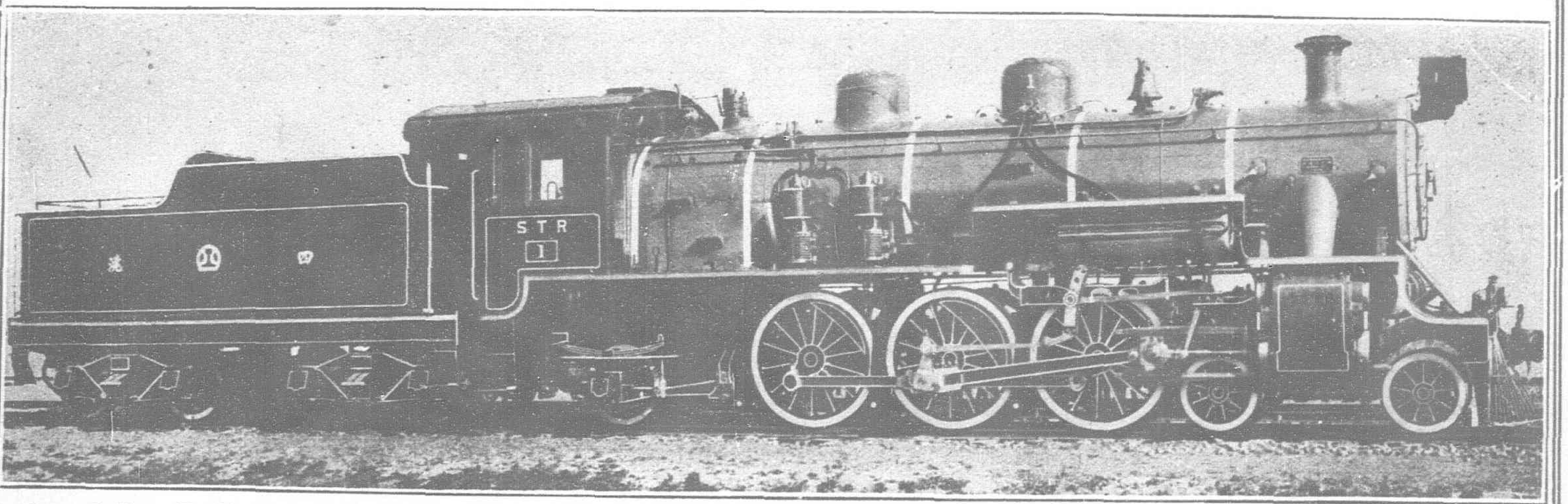

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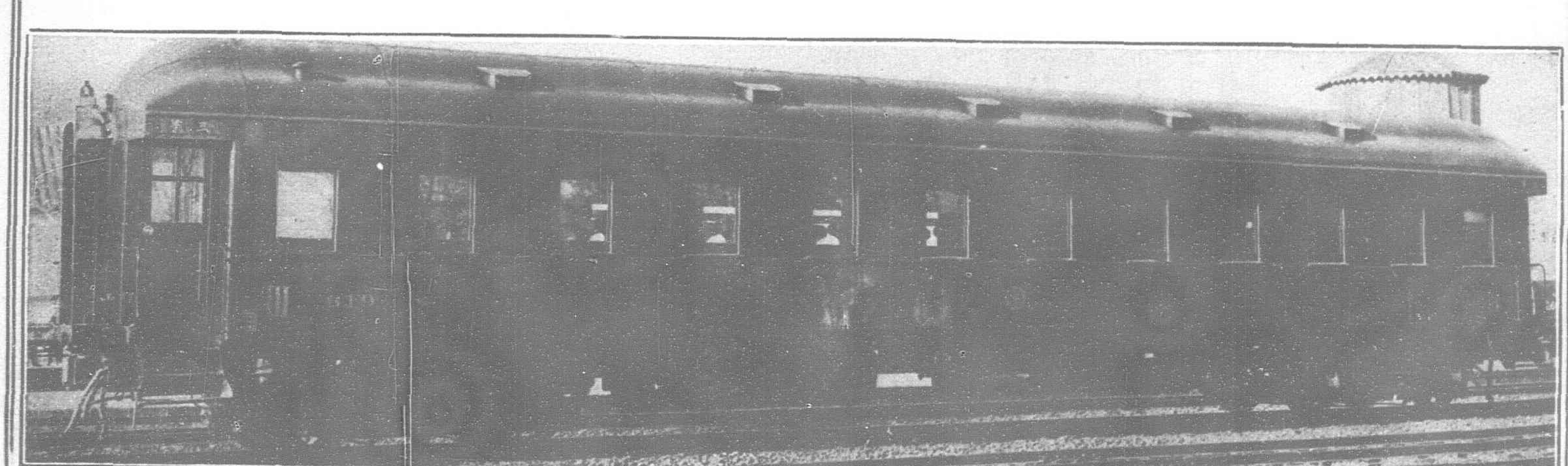

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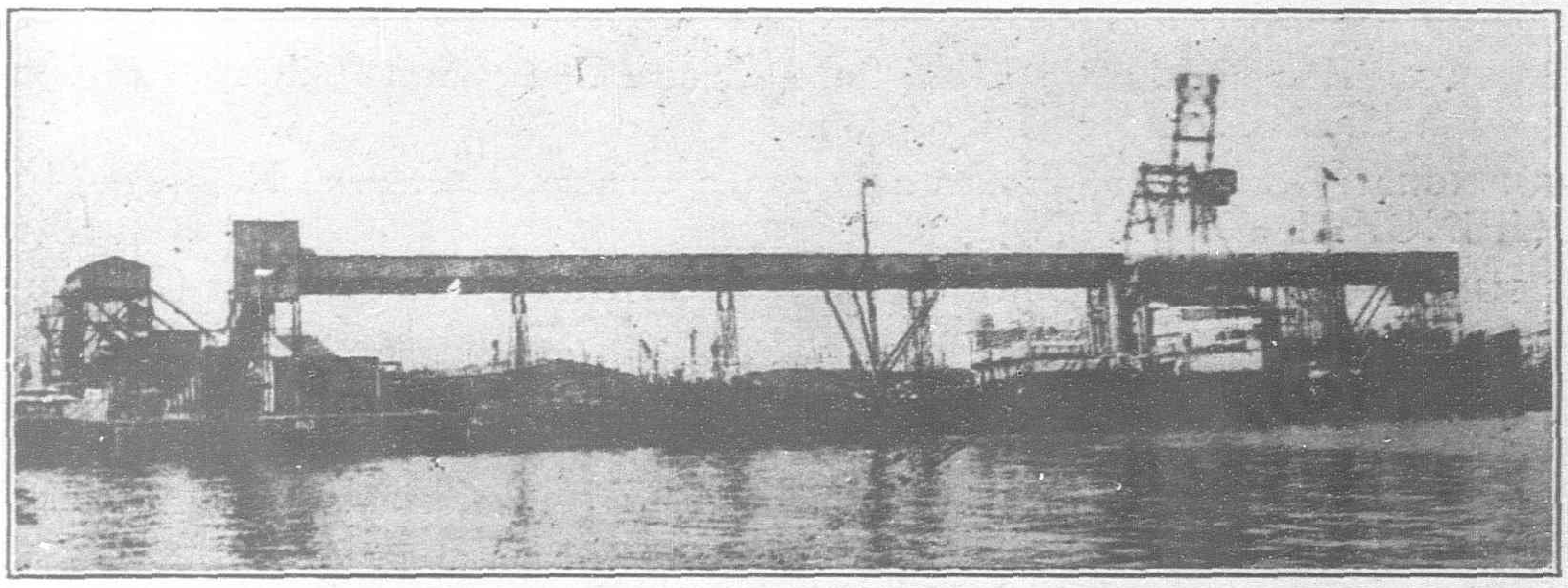

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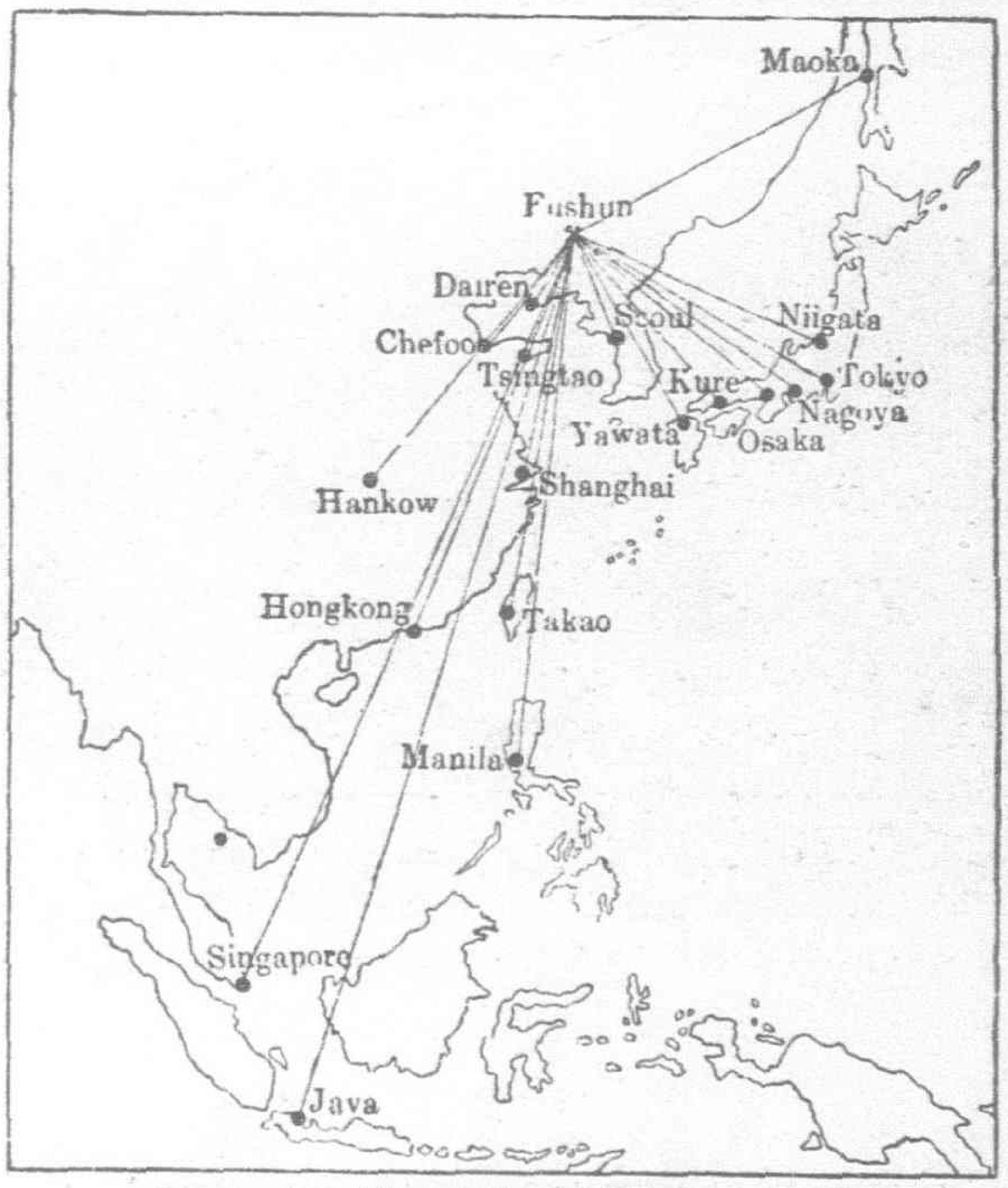

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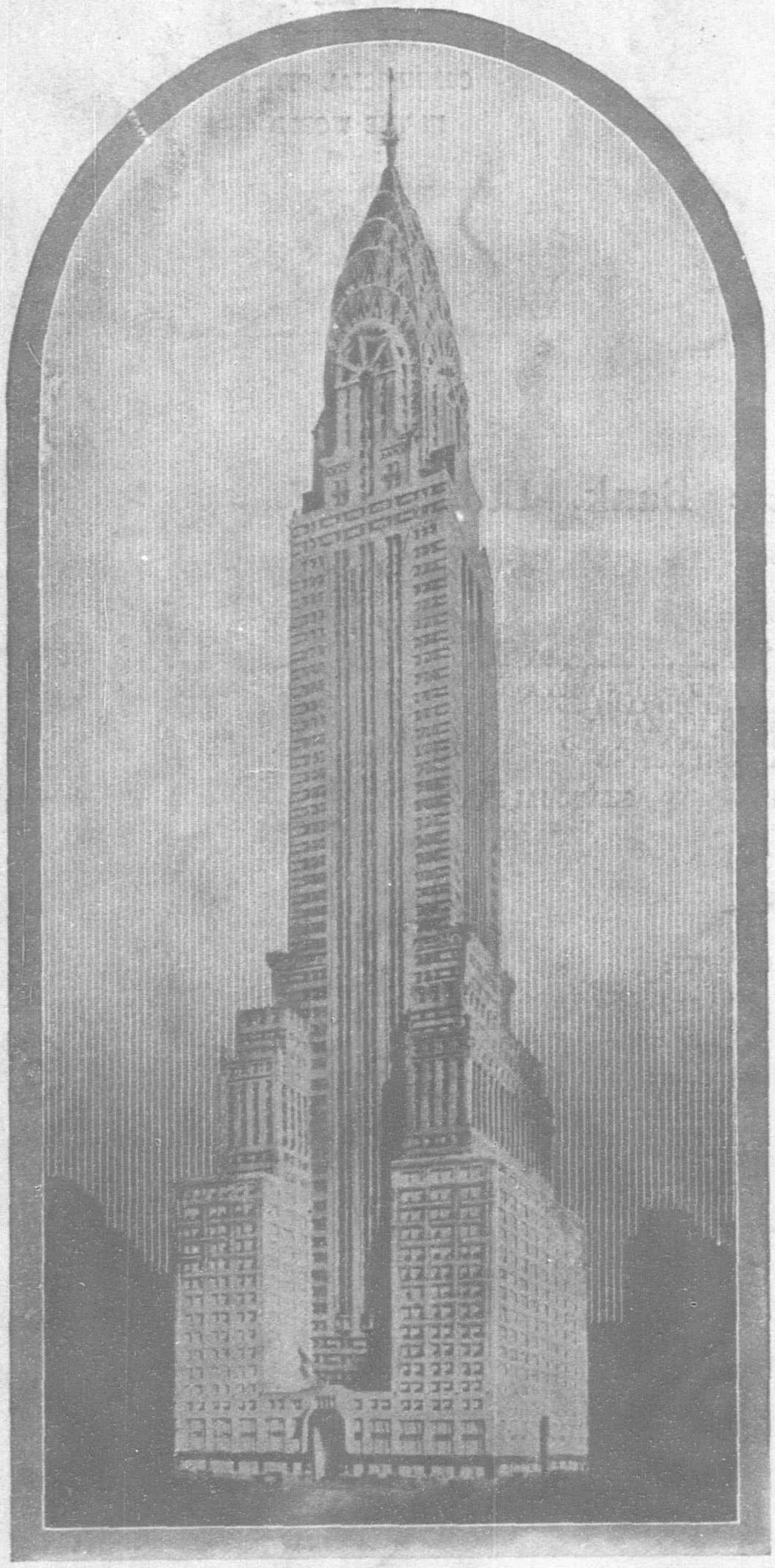

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

Vol. XXVI SHANGHAI, JANUARY, 1930 No. 1

Minister Johnson's Mission

Mr. Nelson T. Johnson, the new American Minister takes up his duties with a record of twenty-two years of intimate contact with Far Eastern problems. Few men are as well equipped for the China post. He knows China ; he speaks Chinese ; he has a deep sympathy with the national aims and aspirations of the Chinese people. He was in charge of the Far Eastern Division of the State Department during the critical period in Chinese affairs in 1927 and for his wise counsels at that time, was promoted to be Assistant Secretary of State. Minister Johnson is perhaps the best posted man in the United States on the treaties and conventions between the various Powers and China. During his tenure of office, the official Far Eastern group in Washington has developed into the most efficient body of experts on Chinese affairs.

Mr. MacMurray will be succeeded by a man who has worked in close harmony with him for the past ten years. It is, of course, impossible to forecast Mr. Johnson's instructions and policy beyond the suggestion that they cannot differ radically from those which guided Mr. MacMurray. Mr. Johnson was in charge of the Far Eastern policy of the State Department as chief of the Far Eastern Division and subsequently as Assistant Secretary of State. In these positions he was principally instrumental in the determination of the American policy with regard to China. Assisted by Dr. Stanley K. Hornbeck, Mr. Johnson was the guiding personality in preparing such instructions as were sent to Mr. MacMurray from Washington. It is, therefore, to be presumed that the policy of the American Government will be continuous and that Mr. Johnson will differ from Mr. MacMurray only as their individual personalities are different.

The time is long since past when sentiment can dictate American policy or the selection of the American Minister to China. Washington will listen attentively to appeals from the missionary and educational bodies, but its final attitude will be determined by the growing trade and investment necessities of the nation. The policy of the Hoover administration, like that of its predecessor, is preeminently a business one, designed to protect, encourage and expand the foreign trade of the United States. The rapid increase in the volume of American commerical investments abroad compels a radical change in the American outlook on international relations. With fifteen billions in commercial loans at the present time and with an annual outflow of a billion and a half in new issues, it will not be many years before the United States will have twenty-five billions invested in foreign countries. If the United States is to continue in business as a lending nation, if American capital is to develop the backward countries of the world, it goes without saying that there must be some assurance of adequate protection, or our money will remain at home or be diverted into those countries enjoying a stable government and sound credit.

The evidence of a radical change in the traditional American outlook on these matters, reflected so forcibly and unmistakably in the policies of the recent and present administrations, is so clear and convincing, that it seems unnecessary even to invite attention to it.

In no part of the world has American policy undergone such a complete modification and reversal as in the Far East. The American people and the American Government have become impatient with China. The speech of Mr. Thomas Lamont at Amsterdam before the International Chamber of Commerce, the report of the American Red Cross on conditions in China, the attitude of Secretary Stimson in the Chinese Eastern imbroglio, his reply to China's Note on Extraterritoriality, the changed attitude of the American press arising out of the ill-timed attempt to suppress facts and penalize the correspondents, the marked falling off of missionary and uplift contributions, the constant attempts to embroil the United States with Japan have all contributed to harden the American attitude towards China.

The American people still sympathize with the Chinese in their troubles and struggles to establish a stable government and are still willing to extend every assistance to the present régime. But it is impossible to close our eyes to the fact that that mutual good-will and confidence, that forbearance and patience that has characterized the traditional relations between the two countries, has been deliberately dissipated by the intolerant, querulous and head-strong policies of Nanking.

Nelson T. Johnson, U.S. Minister to China

H.E. Minister Obata

The controversy over the appointment of Mr. Obata as Japan's Minister to China should be viewed more in sorrow than in anger. At a moment when the best minds of both countries are devoting themselves to a policy of understanding and reconciliation, the Obata incident can only serve to widen the breach between China and Japan and to discourage liberal elements in Japan, who are anxious to find a formula for friendship between two great neighboring countries. It is incontestably China's right to declare any person inacceptable as a Minister to China, but there is a dignified, formal, friendly way of doing it. It is exceedingly risky to trifle with the sentiments of a powerful neighbor at a time when the country is involved in diplomatic difficulties with other Powers. Japan's attitude of this subject is perhaps best given by the *Japan Times* which stated :

> In view of the fact that an envoy to another nation is usually appointed after it has been determined that the person in question is persona grata, at first glance it may seem as if the Chinese had some grounds for their contentions. However, such conversations as to the acceptability of a candidate are, by the usage of international courtesy, carried on confidentially so that when the appointment is made public the acceptance of the appointee will add further to the amity between the two countries and not be the occasion of any controversy. This, as any one can see, is only a common sense procedure and is always followed when sincerity animates both parties.
>
> Following, therefore, the correct and sincere procedure of diplomatic and friendly usage, our Foreign Office through Consul Uyemura consulted Dr. C. T. Wang, the Nationalist Foreign Minister, as to the Obata appointment. If any objections to Mr. Obata were held on the part of Nanking, Dr. Wang should have immediately made these known or intimated when he would express his attitude on the matter. In view of the fact that no objections were raised by Nanking and that this Government would hardly have proceeded to make the appointment public if there had been any intimation of Nanking's refusal to accept the new minister, it is clear that the Nationalist Government was assuming a misleading attitude. In short China permitted this country to make Mr. Obata's choice generally known before it raised objections to his appointment.

The *Japan Advertiser* gives the circumstances of the appointment of Mr. Obata chronologically as follows :

> On December 7 the Foreign Office here instructed Japan's Consul, Mr. Uyemura, to approach Dr. C. T. Wang, Nationalist Foreign Minister, and explain to him informally the circumstances leading to the choice of Mr. Obata and to ask for Nanking's consent.
>
> While the Japanese Government was expecting Nanking's approval, public opinion in China grew strong against Mr. Obata's appointment, as reports of the choice were circulated throughout the Republic. The opposition to the Obata appointment was based on a report of propaganda, pure and simple, it is alleged, that Mr. Obata in negotiating for the presentation of the Twenty-One Demands in 1915 threat forced the Chinese authorities to accept the demands by a threat.
>
> Seeing that the public opinion had undergone a change against the appointment of Mr. Obata, the Nanking Government adopted a firm attitude toward Japan to meet public opinion in China. This resulted in the request of Nanking for the raising of the status of the Japanese Legation to that of an Embassy and abolition of extraterritoriality in exchange for the recognition of Mr. Obata as Japan's Minister.
>
> On December 10 Mr. Wang, the Chinese Minister, under instructions from Nanking, called on Baron Shidehara, and demanded the raising of the legation rank and extraterritoriality abolition, to which the Foreign Minister replied that those questions should be handled after Mr. Obata is appointed to the Peiping post. This, in effect, was Japan's rejection of China's demands.
>
> Nine days later the Chinese Minister called on Baron Shidehara again and made it plain that Nanking was unable to accept Mr. Obata's appointment, unless the Japanese Government made some sympathetic pledge regarding the immediate raising of the Japanese Legation to the Embassy status and abolition of extraterritoriality, because of the firm tone of the Chinese public opinion.

The Chinese attitude appears in the telegram addressed to the Chinese Government by the Chinese Shipowner's Association which says that Mr. Obata is a Japanese diplomatic official who is well-known for his advocacy of a positive policy in dealing with Chinese affairs and that it was he who was responsible for exacting special privileges from China by means of armed force during his last tenure as Minister to Peking. Furthermore, it continues, he was the power behind the throne in forcing China to accept the famous Twenty-One Demands in 1915.

The telegram says that if Mr. Obata is re-appointed to China, he will pursue his positive policy and will continue to encroach on China's sovereignty. The Association trembles with fear when it thinks of the loss of China's sovereign rights and the menace to the safety of the lives and properties of the Chinese people which will come about if Mr. Obata comes again to China as Minister.

In view of these facts, the telegram concludes, the Chinese Government must notify the Japanese Government that Mr. Obata is *persona non grata* to the Chinese people and the National Government must act in accordance with the desires of the Chinese people by refusing to agree to the appointment, so that China's sovereign rights may be preserved.

The objections to Mr. Obata are due to his connection with the Twenty-One Demands, a document which has not yet been subjected to the full glare of historical research, but which Dr Sun Yat-sen insisted, Yuan Shih-kai had requested Japan to make on China as part of his effort to make himself Emperor. It is true that Mr. Obata was at that time a secretary of the Japanese Legation in Peking : there were other secretaries, clerks and even office-boys. Are they all to be boycotted because they were present in the Japanese Legation at the time the Twenty-One Demands were made upon China ? Is it possible to ignore the fact that when Mr. Obata became a responsible Minister in Peking, when he was no longer a subordinate but had become a principal, he negotiated for the rendition of Shantung with Dr. C. T. Wang, who is at present Minister of Foreign Affairs of the National Government ? Besides, is not a minister the representative of his country and not of his own person ? Whoever was in the Peking Legation during the Twenty-One Demands period would have obeyed whatever instructions he received from Tokyo—and one of the main tasks of the Washington Conference was to vitiate the effects of those instructions. Why lay it all to the door of Mr. Obata ?

The mere elevation of Dr. C. T. Wang to his present position is a recognition of the most permanent of his contributions to the foreign affairs of China, the retrocession of Shantung. At the time of the retrocession, it was generally recognized that Mr. Obata was in a large measure responsible for China's success. In this connection, it is interesting to recall the atmosphere of the moment. A Reuter's despatch from Peking dated December 2, 1922, gave the addresses delivered during the exchange of notes as follows :

> Dr. C. T. Wang, Chief Commissioner of the Chinese Commission, made the following statement on the occasion of exchanging the signed copies of the agreement relating to arrangements for the execution of the Shantung Treaty, at five o'clock yesterday afternoon.
>
> " It is indeed regrettable that for eight years the Shantung question has remained unsettled. Fortunately, however, the two countries concluded a treaty at Washington last year, settling thereby the general principles on this question. In accordance with the terms of that treaty, we, the Chinese Commissioners, under instructions from our Government, have negotiated for five months with you for the settlement of the detailed arrangements. We are glad to see all the questions satisfactorily settled. This is, indeed, a very fortunate event in the interest of the relations of our two countries. We regret very much, however, that the question of landed property hitherto acquired by foreign nationals remains still unsettled. I sincerely hope that after taking over the territory of Kiaochao, our two Governments will also arrive at an agreement at an early date.
>
> " The work within the competence of the First Commission now being concluded, the questions belonging to the Second Commission are still in the course of discussion. We look forward earnestly to an early settlement of the questions of the Second in the same way as those of the First Commission have been settled. This is the earnest hope of our people, as well as that of my colleagues and myself. With your permission I take pleasure in handing you the agreement."
>
> Mr. Obata, head of the Japanese Commission, replied in the following terms :—
>
> " Since we met for the purpose of concluding the detailed arrangements five months have expired. Thanks to the friendly effort and conciliatory spirit shown mutually by the commissioners of our two countries, we have now reached an agreement and have affixed our signatures thereto and decided upon the transfer on December 10. Not only we, the commissioners, secretly rejoice in this settlement, we sincerely believe that our government and people share our gratification.
>
> " Since the Versailles Conference we have earnestly looked forward to a settlement of this question, and only last year were the general principles settled at the Washington Conference. The detailed arrangements being concluded at the time of signing this agreement, we cannot but look forward to the development of Tsingtao day by day in the

(Continued on page 4).

General Chiang Kai-shek on the State of China

The following New Year message from General Chiang to his people is so interesting and vital that we here reprint it in full. Foreigners have often criticized the Nanking Government and the Kuomintang for those very defects to which General Chiang calls attention. It is important that at this critical period in China's affairs, China's leaders are beginning to realize that "fidelity and a sense of honor are the foundation of the Kuomintang and the Government." Such a conception may, in time, change the character of the Party and Government and usher in that period of reconstruction to which all friends of China look.

The late Party Leader, Dr. Sun Yat-sen when on his deathbed, entrusted the comrades of the Kuomintang with the heavy and important mission of maintaining peace while at the same time struggling for the salvation of the country. In pursuance of this injunction, our comrades, by virtue of their unwavering exertions and devotion to the cause of the Party, have succeeded in crushing and exterminating its various enemies. However, in foreign affairs, the unanimous front of the Imperialists remains as formidable as ever. In internal affairs, on account of the obstruction of the reactionaries, the constructive efforts of the Government have not been crowned with success. It is hoped that starting with this year, with the dawn of peace in sight, we may actually carry out some measures of reconstruction and political tutelage.

What is more deplorable is the general moral degradation of the people during the last few years with the result that the last vestiges of the traditional virtues and morality of the nation are fast disappearing. Such a state of affairs, if not immediately rectified, will soon cause the extinction of the nation, even if it were not harassed by Imperialists and Communists.

The general lack of morality and sense of honor on the part of the people constitutes a far more dangerous menace to the future of the nation than the economic and military aggressions of foreign countries.

The most enduring and monumental result of the strenuous struggles of the late Dr. Sun Yat-sen has been the awakening, through his personality and undaunted spirit, of the people from the state of lethargy into which they had long degenerated and the rousing of Party members to a keen enthusiasm and zeal to struggle for the welfare of the country. So inspired, Party members in the past made noble and memorable sacrifices.

In the first campaign in Canton, the cause of the revolution received repeated setbacks. More than a dozen times were the revolutionary armies defeated. But the spirit of the revolution was stimulated by these repeated failures. The people's sympathy for our cause became more genuine, moved by our undaunted spirit. Thus stirring history was made.

After, however, the establishment of the Republic, our comrades, thinking that the Revolution had already been brought to a successful conclusion, gradually degenerated into a state of complacent stagnation, which fact gave the chance to Yuan Shih-kai to stage his Imperial *coup d'etat*.

It was with the realization of this state of inaction, that the late Dr. Sun Yat-sen reorganized the Party and brought about its rejuvenation and the subsequent success of the Northern Punitive Expedition. This historical fact points out most convincingly the truth that the Party is respected by the people only when the personality of the party members should be deserving of such respect. If the party members all possess the virtue of fidelity and a high sense of honor, then nothing can affect the Party; likewise, if the party members are lax and disorderly in their conduct, then the Party will perish. This is a very clear and simple fact, on which depends the salvation of our people. Oh! Why have our Party members ever disgraced themselves in the face of the Leader's teachings?

The past has gone forever. But what we have already accomplished is only a small part of what we have set for ourselves. The more adverse the circumstances, the more should we strive to overcome them and make ourselves conquerors of our environment. I have followed the late Leader for more than twenty years. I always observed that his spirit became more fearless when he was in the gravest danger. Not only did he face great odds without fear, but he even conquered the fearful odds by the sheer magnanimity of his personality. Repeatedly he overcame reactionary efforts against the Revolution in this manner, so that every apparent

General Chiang Kai-shek, Chairman of the Government Council set-back always turned out to furnish further impetus to the irresistible progress of the revolution.

Therefore heart-breaking difficulties should not deter us, but should, on the contrary, strengthen our mettle and spirit to face it. Do we not all remember the words of Mencius that "great deeds are accomplished by a discipline of heart and mind" and that "there is no better discipline than that forced on one by adverse circumstances ?" To the right-minded person, difficulty comes as an opportunity for further training of will power. Shall we not then rejoice over the prospect that difficulty is approaching us ?

Be true followers of our late Leader, by following his immortal spirit ! To run away from danger, to go ahead only when there is something to gain, to live in a disorderly manner, and to be steeped in vices—you might escape from the hands of the law, but how could you escape from the bankruptcy of your personality ? At this time of grave national danger, with members of the Party morally bankrupt, if the nation should ever perish, on whose head will fall this responsibility ?

The organization of our party is now known to all. In every "Chu" (section), there is a "Chu" Party Headquarters, then there are "Hsien" (District) Party Headquarters. Wherever there are party Headquarters, the Party members will have opportunity to show themselves to the people that they are their true and sincere guide. If they are honorable in their conduct, so will their conduct influence the people ; if they are corrupt and dishonest, likewise their conduct will so influence the people. Good and respected elements will come to co-operate with the Party Headquarters, when their members are good and respected. They will go away from the Party Headquarters, and will even act against the Party Headquarters, if the party members are corrupt and dishonest. If all the good and respected elements of the people run away from and hate the Party, how can the Party be of any service to the people and how can it lead the people, this being its duty during the Political tutelage stage ?

The Communists are hated by the people, because they are denationalized and without any sense of honor. The Reorganizationists* are despised by the people, because they are disloyal and dishonest and, therefore, untrustworthy. The militarists are shunned by the people because they, while placing themselves under the aegis of the Party, are nevertheless always plotting against it and are, therefore, despicable. Their lot should give us sufficient warning, and should convince us that the sense of justice is still with the people.

If all of our comrades should co-operate in a spirit of fidelity and with a high and rigid sense of honor, the nation can easily be lifted from its present state of lethargy and moral degradation ; and all obstacles in the way of the revolution can easily be removed and overcome. The program of national reconstruction and political tutelage could then be promptly and successfully carried out, leading to a régime of peace, prosperity and happiness.

If we can not get together in this spirit, then we are already spiritually dead, which is usually followed by physical extinction. We would certainly perish, even if there were no external and internal troubles.

H.E. Minister Obata

(Continued from page 2)

future in view of the results of our eight year's activities, which are to be completely transferred to China.

"I share the regret of Dr. Wang that the question of Landed property is still unsettled and the work of the Second Commission not yet concluded. I do not doubt that the day is not far distant when we shall also see them satisfactorily settled if we try to proceed in the same spirit of mutual conditions."

Mr. Obata then delivered to Dr. Wang the signed copy of the agreement in the Japanese language.

Another item dated December 15 reads :

Dr. C. T. Wang received the representatives of the press at the usual reception at noon to-day. The Premier and Minister of Foreign Affairs said that he had not yet picked up all the threads of the Foreign Office business, as his time had been occupied so fully in winding up Shantung affairs. He was happy to say that the handing over of Tsingtao had been accomplished in a very satisfactory way. There was bound to be some dislocation owing to the transfer of control but there was every prospect of getting things into smooth running order very soon. He was confident that order would be maintained in the future.

The atmosphere then was most friendly.

The Chinese Government hoped then to present Mr. Obata with the highest civilian decoration, but as this was already in his possession, he was given the highest military decoration. These decorations were presented to him upon the petition of Dr. C. T. Wang, made to his Government in 1922, eight years after the presentation of the Twenty-One Demands, for which the same Minister of Foreign Affairs now finds Mr. Obata *personna non grata*.

We have no desire to add to Dr. Wang's difficulties. As Minister of Foreign Affairs, it is his duty to carry out his instructions no matter how difficult or unpleasant they may be. It need not be questioned but that Dr. Wang's personal friendship for Mr. Obata might have made the conduct of Sino-Japanese relations much smoother than they have been for years. For months they sat together and worked over the very serious problem of the restoration of China's right to the former German colonies in Shantung and their work was finally consummated in a glorious success with paeans of praise on all sides, and the Japanese cannot disregard the fact that Dr. Wang, as Minister of Foreign Affairs, is forced to bow to popular clamor, which demands yet another foreign victim. But Dr. Wang should have explained publicly to his people that this is not the time for China to irritate Japan nor is it within the realm of reason to make Mr. Obata the victim in this situation.

CORRECTION

The article on the Tanna Tunnel which appeared in our December issue and which was credited to Mr. E. Kusano, was in fact written by Mr. Newton W. Edgers.

For, the present Japanese Government has been singularly pro-Nationalist. Baron Shidehara, the Japanese Minister of Foreign Affairs, has made a pro-Chinese program the keystone of his political career. The late Mr. Saburi was sent to China because of his known pro-Chinese sympathies. Nothing intervened between the death of Mr. Saburi and the appointment of Mr. Obata to change the Japanese policy towards China. The assumption of statesmen must have been then that Baron Shidehara selected Mr. Obata because his knowledge of the man, of his work in China, of his principles and ideals, convinced him that Mr. Obata was the most suitable successor to Mr. Saburi in the conduct of those policies for which Baron Shidehara has made himself responsible. Now, comes the first rebuff to Baron Shidehara—how many more shall he, who has been China's true friend for years, be forced to accept before his friendship turns from disappointment to disgust, from disgust to enmity ? Can a country like China, faced on the one hand by the fearful Moscow Conference of January 25 and on the other hand by protracted and difficult negotiations with all the Powers concerning new treaties, afford to involve itself in an embroglio with Japan from which the only outcome can be humiliation ?

Have those who have forced this situation on the Government stopped for a single moment to ponder on the possibilities of their act ? What can Japan possibly do in this situation ? If Baron Shidehara accepts China's insult to Mr. Obata and appoints a new Minister, his own position would immediately be endangered. In all probability, the Cabinet would fall. If Baron Shidehara rejects China's insult, then it will be impossible for months to appoint a Japanese Minister to China. The situation now is that Japan and China are without a treaty, without a Minister, on the verge of an utter disappearance of friendly relations. Neither China nor Japan can afford that and the sooner a solution is found for the deadlock, the happier a day it will be for both China and Japan.

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*Left Wing Kuomintang Members.

Sir Harry Fox

An entirely deserving honor has been bestowed upon Mr. Harry Halton Fox, former Commercial Counsellor of the British Legation in Peiping, who has been honored by His Majesty with a knighthood for long and faithful service as a British consular official in China.

Sir Harry, since 1918, has acted as the British Commercial Counsellor and has been of very great service not only to British trade interests but to the cause of the general development of the trade of China. He partook of all the important commercial conferences in China during his service in this office, being, in particular the British representative at various Tariff Conferences.

Sir Harry Halton Fox was born on May 23, 1872, and was educated at Dulwich College, London, later passing a competitive examination for the British Consular service. He first came to China in 1890 and was attached to the Peking Legation as student interpreter. His first post outside of Peking was as acting Vice-Counsl in Korea during 1893 and 1894. From the latter year until 1900 he served in various consular capacities in various parts of China and came to Shanghai as acting Vice-Consul in 1901 where he remained until 1905 during which year he was transferred to Ichang as Consul.

In 1910, he was appointed acting Commercial Attaché at Peking and occupied that post for one year after which he was appointed Consul-General at Yunnanfu. In 1913 he was promoted to Consul-General at Chengtu and later proceeded to Hankow as acting Consul-General remaining there until 1915. Two years later he was officially appointed Commercial Attaché at Peking and, when the name was changed to that of Commercial Counsellor, he was the first man to be appointed in China to the post. He occupied the position until his retirement from the Consular service a few weeks ago. In June 1914 he was awarded the C.M.G.

A keen student of Chinese affairs and an excellent Chinese scholar, he commanded wide respect among the Chinese and leaves a host of friends among these in all parts of the country.

Sir Harry Fox

British trade has suffered fearfully since the boycott movement in 1925. It was Sir Harry Fox's job to resurrect that trade in spite of all gloomy predictions, important progress has been made in that respect. In a report written in 1928, Sir Harry summarized the situation as regards British trade in the following terms which are as true to-day as they were then :

> Such consolation as may be derived from a situation profoundly unsatisfactory both for the Chinese and ourselves, is that when the long-looked for trade revival does come we are in as good a position as any of our competitor to meet and take advantage of it. Writing in one of these reports six years ago, I remarked that our main strength in China lay in the old-established British firms whose "hong" names are known and respected from one end of the country to the other. These firms, who work in close connection with British banks, shipping and insurance companies, have branches in all the principal treaty ports and good Chinese connections in the interior. Their credit is good and the men who manage them possess a knowledge of local conditions and business methods which they have acquired by long and often costly experience. I added that British merchant firms in China were in great measure responsible for the high reputation for commercial honesty enjoyed by Chinese traders as they stand between the home manufacturer or merchant and the Chinese dealer, they often have to take the risk of fluctuations in exchange and carry the goods when consignees, as they sometimes do, "go Ningpo more far."
>
> Much water has flowed under the bridges since these words were written, much good British money in China has "gone west," many an old-established firm has had a hard struggle to keep its head above water and the Chinese reputation for fair dealing and respect for contracts has not, it must be regretfully admitted, always been maintained. But in spite of the growing tendency of the Chinese to cut out the local merchant firm and deal direct with the home manufacturer and merchant, and in spite of the increasing restriction by the Chinese authorities of the privileges British firms have hitherto enjoyed of marketing their goods in the interior, I remain of the opinion that in the British Merchant firm we have a form of selling organization which has on the whole successfully withstood the shock of successive years of bad business, boycotts and strikes, excessive taxation and all the other obstacles to trade referred to in this report, and that these firms are an asset which, when the time comes, will enable our people to take full advantage of the opportunities for trade which China offers to the commerce and industry of the British Empire.
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> But British manufacturers would do well to remember that there is competition of the keenest kind in this market, and that it is absolutely essential that they should continue to do their utmost to being their costs of production down to the lowest possible level so as to reduce that margin of difference between British and competing foreign goods which has so often in the past militated against the sale of articles of British manufacture in China.

In the present atmosphere in China, trade competition grows increasingly keen and requires an altogether new attitude towards the purchaser. The day of the Taipan sitting about and waiting for his customer to come to him or to see his compradore is gone. Trade is developed by "drumming" and by the most modern methods of merchandizing. The older British firms perhaps find changing times difficult to reconcile with former conditions but the fact remains that it is necessary to "drum" trade if there is to be any and the future Commercial Counsellors will have to be expert "drummers."

W. B. Poland

Railway Finance Advisor

Elsewhere in this issue will be found the very interesting report of the work of the Ministry of Railways, which is so fundamental in the reconstruction of China. In connection with this report attention should be called to the valuable services of Mr. W. B. Poland, a member of the Kemmerer Commission, who was especially designated as an expert on railway finances and who has spent almost a year studying the very intricate problem of railway finances in China, with the special objective of the economic rehabilitation of China's railways.

It is impossible at this time to refer to Mr. Poland's report because the reports and recommendations of the commission of Financial Experts will not be made public until they have been translated into Chinese and that has not yet been done. Nevertheless, it is undoubtedly correct to assume that Mr. Poland has indicated two general lines in his recommendation :

1. It will be impossible to find financing in foreign countries, particularly in the United States, for China's railways, until China has met her outstanding defaulted obligations, which as regards the railroads amount to between $60,000,000 and $70,000,000. It is understood that Mr. Poland has worked out a complete and feasible plan for the liquidation of these outstanding obligations.

2. It is understood that Mr. Poland has proposed as a basic formula that before any new work is undertaken, the existing railways of the country must be rehabilitated. Practically no replacements have been made in China's railways during the past six years and with regard to some railways nothing has been done for 10 years, which means that the lines are in a terrible condition and that unless something is done very soon, some of them may die.

Mr. W. B. Poland

Underlining both these recommendations is the fundamental one that political conditions in China must be stabilized, that civil wars must stop before anything can be done to rehabilitate the lines. All the railways of the country must be placed under the single authority of the Ministry of Railways and provision must be made to protect the railways from the unlawful seizure by militarists. Even at this moment several of the railways in North China are not operating because of military interference and the funds of these lines are being held by military satraps to finance civil war. It is impossible for Mr. Poland's proposals or for any plans of the Ministry of Railways to be fully effective as long as military men are able to interfere with the authority of the Ministry of Railways and as long as general political conditions in China continue to be unstable. Until Mr. Poland's report is published, it is impossible to discuss his recommendations intelligently, but enough is known of Mr. Poland's work elsewhere and of his general attitude while he was in China to believe that he has contributed invaluably to the economics of China's railways and that his work here when it is fully known will be appreciated by the Chinese people.

W. B. Poland was born at West Point, New York, son of General J. S. Poland. He was graduated from the Massachusetts Institute of Technology and was awarded an advanced engineering course. He served as engineer in the United States River and Harbor Service and was in charge of engineering and construction at Point Judith Harbor Refuge and other river and harbor works. He also served in the Spanish-American war, after which he was detailed on engineering work under General Goethals. In 1904 he became the general-manager and chief-engineer of the Alaska Central Railway, the line which was afterwards completed by the United States Government. From 1907-1913 he was Vice President and Chief Engineer of the Philippine Railway Company.

It was during the Great War that Mr. Poland came into the closest contact with President Hoover. From 1914 to 1918 he became Director in Belgium and Director for Europe of the Commission for Relief in Belgium and France. In 1919 he was the Engineer and Manager of the American Military Mission to Asia Minor and Trans-Caucasus under General Harbord. During 1920 and 1921 he was joint liquidator for the Commission for Relief in Belgium, closing the $923,000,000 of operations. From 1922 to 1925, he was Director of Railways and Port construction in Yugoslavia. From 1926 to 1928 he was Director-General of Railways for the Imperial Government of Persia.

The above sketch of Mr. Poland's career is neither complete nor does it adequately do him justice. His work has always been of the constructive character and it is particularly fortunate that China has been able to utilize the services of such a man at this, the beginning of its reconstructive era.

Kokusai Kisen Invites Bids For Three New Ships

The Kokusai Kisen Kaisha has definitely decided to construct three 9,500-ton class Diesel ships. The Yokohama Dockyard, the Uraga Dockyard and several other shipbuilders were asked by the Company to make their bids. As regards the engines to be installed in these ships, either the solid injection M.A.N. or Burmeister & Wain types will be selected.

To cover the construction cost of these new ships, the Kokusai Kisen Kaisha sometime ago sold its old fleet consisting of some 130,000 tons. The Government's announcement of the exact time for lifting of gold export ban induced the Company immediately to invite the bids.

The Silver Crisis in China

No matter how one attempts to explain away the silver crisis on the ground that silver has dropped in value throughout the world, the fact remains that in China, and therefore in all markets, there would not have been such a drop except that large areas of this country are still in a condition which precludes the shipment of silver or goods from one place to the other. The result is that a city like Shanghai has become the depository of the silver reserves of the entire country, while the interior is unable to send to Shanghai raw materials for export or even for domestic manufacture. Herein lies the principal cause of the silver slump in China.

It is exceedingly interesting that at a time when the National Government is proposing the rendition of the International Settlement of Shanghai, fundamental economic laws are at work to prove the absolute necessity of maintaining the Settlement much as it is, that is, as a free and independent port for the safe-keeping of reserves. At a time like the present, when the interior of China is silver-starved, Shanghai is silver surfeited, which explains so much more than the reams of propaganda on either side of the political question. In Shanghai there is peace, security and silver; in the interior, there is war, insecurity and no silver. No statement of the fact could have been more succinct and clear than the fact itself.

Many of those who have discussed the problem avoided the fact, because facts are anathema to many political mentalities which seek methaphysical explanations for what is as obvious as the tips of their noses. They offered all kinds of nostrums to solve a problem which can only be solved by peace; they tried to explain away all kinds of errors, when the single error was war. Their explanations sounded like so much ragged verbiage dispensed plentifully to those who had nothing else to do but to listen. Against them appeared a short, unmistakably authoritative statement by Mr. T. V. Soong, the Minister of Finance, who said:

> "The price of silver is dependent upon world conditions, of which the local situation is only a part. So far as the present slump in silver is an outcome of conditions in China, it is due to the unsettlement of business conditions growing out of internal military operations and the difficulties with Russia.
>
> "The principal remedies which can be adopted in this country are the restoration of peace and order and the re-opening of rail and water communications. The condition of the silver market adds weight to the reasons which should urge all patriotic citizens to work disinterestedly for the complete unification of the country.
>
> "With order and communications re-established, agriculture and industry can revive; the movement of goods within the country will be stimulated by the prevailing peace and security; the export trade can flourish and the demand for silver will automatically be increased. Weather conditions this winter presaging good crops for the coming harvest throughout the country, will further assist in the recovery of silver.
>
> "Measures that have been suggested in public discussions, such as restricting and taxing the import of silver, could hardly be expected to have any appreciable permanent effect upon the underlying situation. Restriction upon one of the leading world markets for silver might even lower the world price of silver.
>
> "It has been suggested in some quarters that the adoption of the gold standard in China would tend to decrease the demand for silver. No plans are in contemplation that would involve the circulation of gold coins in China. Indeed, monetary reform in this country will inevitably require a largely increased circulation of silver coins.
>
> "The new mint at Shanghai with a daily capacity of $1,000,000 is ready to begin operations very shortly and to furnish such silver coins as may be required by expanding trade.
>
> "Therefore, my recommendation to the Government will be that any interference with the free movement of silver in this country will be harmful and that the stabilization of the value of silver can best be achieved by the restoration of peace and order and the free movement of our products throughout the country."

The problem which most acutely faced the Chinese Government in connection with the silver slump was the safeguarding of China's foreign obligations in gold which amount to approximately £9,000,000 annually. A very complex system was devised to protect these by calculating the import duties in accordance with a new gold unit arbitrarily created by the mathematicians of the Ministry of Finance. The plan and working of the new system has been most accurately described in the following authoritative statement:

The purpose of the conversion of the basis for collection of customs duties on imports from abroad from Haikwan Taels to a new gold unit was to protect the position of customs-secured debts and to avoid serious loss of revenues by reason of the high cost of gold remittances.

The Government remits abroad each year approximately £9,000,000 to meet is obligations. In February 1929, when tariff autonomy became effective, one Shanghai tael could buy 2/7; now, one Shanghai tael can only buy 2/- ½ which netts the Government a loss of 26 per cent.

To correct this situation, a plan has been devised which was made effective in accordance with the instructions of the Minister of Finance to the Chinese Maritime Customs. In accordance with this plan, the conversion of the standard for collecting customs duties will be accomplished in two phases: the first beginning on February 1 and ending March 15, takes as the exchange rate 2/2½ which was the average rate for the last quarter of 1929; the second, beginning on March 16, takes 2/7, which was the average rate for January 1929, as the rate of conversion.

This new system will be applied only to specific duties on imports from abroad. It will not affect inter-port duties nor exports. It does not affect *ad valorem* duties, which are expressed in percentages based on gold invoice values.

The following explanation in detail of the working of the new system may be accepted as authoritative:

The Haikwan Tael is a hypothetical unit, for Customs purposes only. The ratio, at presnt, is Haikwan Taels 100 equals Shanghai Taels 111.40.

The new unit has a gold value of Gold $0.40 or about 20d.

On February 1, the Haikwan Tael will be taken to be equal to 1.50 of the new unit. At current exchange, the Haikwan Tael is worth about Gold $0.56 or about 28d. Thus, on February 1, when the first phase of the new system becomes effective, the Haikwan Tael will be valued at Gold $0.60. or about 30d.

This may be further illustrated as follows:

Take a commodity worth Shanghai Taels 100, paying a duty of Haikwan Taels 10 or Shanghai Taels 11.14. The amount of duty to be paid on this commodity, between February 1 and March 15, would be about Shanghai Taels 12. Thus, the total cost of the article, value and duty, would be increased from Shanghai Taels 111.14 to about Shanghai Taels 112 or less than one per cent.

From March 16, the Haikwan Tael will be given a value equivalent to 1.75 of the new unit, that is, to G.$0.70 or about 35d. The same commodity would be taxed about Shanghai Taels 14 and the increase would be, for value and duty, from Shanghai Taels 111.14 to about 114 or a little under three per cent.

These illustrations are based upon the assumption that silver will remain as it is. If the value of silver rises to approach 2/7, the amount of the increase will be proportionately less. So that if 2/7 should be reached, there will be no increase at all.

At present, the average of Customs duty is about 12 per cent. The above illustrations amply indicate that the average increase in cost of goods laid down in Shanghai, at the present rates of exchange, will be approximately one per cent after February 1 and three per cent after March 15.

Other reforms to be effected in the near future will be the abolition of the tael in July, the opening of the Shanghai Mint, which should take place early in the Spring, the abolition of *likin* in October. If there is peace in China, these reforms can easily be effected. If there is no peace, they will have to be postponed as they were postponed last year. *The cure for all evils in China is peace*, for peace will give the Government and the people of China a breathing spell during which they can carefully analyze their problems, valiantly risk daring and wise solutions and energetically devote themselves to internal reforms.

Railway Enterprise Under the National Government

(A resume of the work of the Ministry of Railways since its establishment)

[The following official report of the accomplishment of the Ministry of Railways since its inception will shortly be issued by the Ministry of which Mr. Sun Fo is the Minister. Comment is superfluous as the report speaks for itself.—ED.].

I. A Brief History of the Ministry of Railways

Dr. Sun Yat-sen said "Transportation is the key to Industries and Railway the key to Transportation." Verily the Railway is the fundamental instrument of transportation and therefore the foundation of industrial development. That is why Dr. Sun Yat-sun advocated, at the very beginning of the Republic, the construction of a 100,000-mile railway net-work. His advocacy has taught us that without executing the Railway policy, material construction in China will be impossible.

The National Government, acting on Dr. Sun's instruction, established on November 1, 1928, under the Executive Yuan the Ministry of Railways to take charge of the Railways in the Country and to consummate Dr. Sun's plan. Mr. Sun Fo was appointed Minister; Messrs. Lien Sing-hai and Wang Cheng were appointed Political and Administrative Vice-Ministers respectively. On the day of the Ministry's inauguration, it consisted, as provided in the Organic Law promulgated by the National Government, four departments, namely, the Department of General Affairs, the Department of Railways Administration, the Finance Department and the Department of Planning and Construction with Messrs. Chen Yen Chün, J. K. Choy, Wang Cheng and Y. S. Chun as Directors of the respective departments. Messrs. C. S. Liu, T. C. Yen, Kuan Keng Lin and J. Usang Ly were appointed Counsellors.

Having taken over from the Ministry of Communications all duties pertaining to Railways, the Chiaotung University in Shanghai, the Civil Engineering College in Tangshan, the College of Railway Administration in Peiping and a chain of Railway Middle and Primary Schools established in the various Railway Centers for the education of the children of Railway employees; the Ministry set to work. Minister Sun Fo introduced in the Central Political Council of the Kuomintang two Administrative Policies; *i.e.* the Centralization of Railway Administration and the Independence of Railway Accounting System. Having passed these resolutions, the Central Political Council ordered the Ministries of War and Railways to execute these policies in full. Railway enterprise in China began a new life.

On account of the lack of railway experts in China, Dr. J. A. L. Waddell was retained as Consulting Engineer, Mr. J. J. Mantell as Adviser on Railway Management, Mr. R. S. Norman as Legal Adviser and Mr. Wm. B. Poland as financial Adviser to the Ministry.

To facilitate business transactions, an office of the Ministry was established at Shanghai with Mr. Tiehsan Chen as Director.

Sun Fo, Minister of Railways

So much for organization, let us now come to the administration of the various Railways.

Since Nanking became the National Capital, the political and economic importance of the Nanking-Shanghai and the Shanghai-Hangchow-Ningpo Railways has gradually grown. Mr. J. K. Choy was appointed concurrently to take charge of these administrations.

The Peiping-Mukden and Peiping-Suiyuan Railways, being trunk lines of the North-East, have suffered great damages from internal strife of late. They urgently need rehabilitation. Mr. Wang Cheng was appointed to concurrently take charge of them.

The Lunghai and the Tatung-Chengtu Railways were formerly administered by Directorates-General. Upon the recommendation of the Ministry, the Executive Yuan abolished the above mentioned offices so that the administration of these Railways would be under one head instead of two.

The settlement of the Tsinan Incident called for reorganization of the Kiao-Tsi Railway. Consequently the Kiao-Tsi Railway Managing Commission was established with Dr. T. C. Yen as Chairman of the Commission.

Later, with its head office removed to Peiping, the Hankow-Peiping Railway was renamed as Peiping-Hankow Railway. Mr. W. T. Liu was appointed Managing Director.

Messrs. Pan T'ing-hsien, Sun Ho-kao and Fang Ta-chih were appointed Managing Directors of the Peiping-Suiyuan the Tientsin-Pukow Railways and the Hunan-Hupei Section of the Canton-Hankow Railway respectively.

Then the three Railways in Kwangtung come under the actual control of the Ministry. The Canton-Samsui Railway was amalgamated into the Canton-Hankow Railway with Mr. Chen Yin-wen as Managing Director, while Mr. Liu Chiu-ko was made Managing Director of the Canton-Kowloon Railway.

Upon the request of the Kiangsi Provincial Government, the Ministry took over the administration of the Nanchang-Kiukiang Railway. Mr. Kung Hsueh-shiu was appointed Managing Director.

After the inauguration of the Ministry, the Ministry of Communications, acting on the order of the State Council transferred to the Ministry of Railways all duties pertaining to National Highways. A National Highway Planning Commission was organized with three Commissioners appointed by the Ministry and one representative from each of the Provincial Construction Departments and Mr. Y. S. Chun as Chairman. It completed its task of planning in three months.

The Ministry of Communications also transferred its European office at Paris which served as an organ to arrange for international through traffic. Upon taking charge of this office, the Ministry appointed Mr. K. Y. Woo as Director and concurrently as Delegate to the International Railway Union representing the Peiping-Liaoning, the Peiping-Hankow and the Tientsin-Pukow Railways.

For the classification of goods and the determination of tariffs, the Advisory Committee on Fares, Rates and Classification of Goods was appointed with the Director of the Department of Railway Administration as Chairman of the Committee.

In order to unify the accounting and statistical systems of the various Railways, the Advisory Committee on the Unification of Railway Accounts and Statistics was appointed with the Director of the Finance Department as Chairman.

An Editorial Committee on Railway Rules and Regulations was also appointed. Vice-Minister Lien Sing-hai serves as Chairman.

To eliminate corruption in the purchasing of Railway materials, a Purchasing Commission, a Commission on Selection of Tenders and a Commission on Inspection of Purchased Materials were organized. Later, the three Commissions were amalgamated into the Purchasing Commission with Messrs. Hu Chi-hsien, Tiehsan Chen and Chen Chiu-an as members of the Standing Committee. Three Sub-committees were appointed to Peiping, Hankow and Canton.

For the training of qualified personnel for Railway Service, the improvement of the existing Railway Schools and the education of the low grade staff and laborers now in active service, the Committee on Railway Education was organized with at first Mr. Y. S. Chun and later Mr. Kuan Keng-lin as Chairman.

More than fifty years have elapsed since China first adopted modern means of communication, but no complete and reliable record of the History of Communications is available. Since the organization of a Committee to compile a history of communications under the auspices of the Bureau of Compilation and Translation in the defunct Peking Government in 1922, the history has not been completed although several changes had already taken place. The Ministry, in co-operation with the Ministry of Communications, organized the Committee for Compiling the History of Communications with Mr. Kuan Keng-lin as Chairman and Mr. Chang Hsin-cheng, a division chief of the Ministry of Communications as Editor-in-Chief.

In last September Vice-Minister Wang Cheng resigned on account of poor health. Mr. J. Usang Ly was appointed to succeed him. Meanwhile Mr. Hu Chi-hsien was appointed Director of the Finance Department, Dr. T. C. Yen was transferred to be Chief Technical Expert. Messrs. Liang Han-chau, F. K. Sah and Dr. King Cheng-yang were appointed Counsellors.

Not long after, Mr. J. K. Choy was sent to Europe to study Railway conditions and problems. Mr. F. K. Sah was made acting Director of the Department of Railway Administration and Mr. Hu Chi-hsien was appointed to concurrently take charge of the Administration of the Nanking-Shanghai and Shanghai-Hangchow-Ningpo Railways.

The Peiping-Mukden Railways was renamed as Peiping-Liaoning Railway with Mr. Kao Chi-yi appointed as Managing Director. The unification of administration in the Peiping-Liaoning Railway was effected.

For one year after the establishment of the Ministry, no serious change in organization took place. But being newly established the division of duties inside the Ministry worked more or less on a trial basis. As the Ministry goes on experience calls for reorganization. Therefore, on November 18, the National Government promulgated the revised Organic Law of the Ministry. In the new organization the Ministry is composed of the following departments and bureaus:—

1. The Counsellors's Office
2. The Secretariat
3. The Department of General Affairs, with Mr. Chen Yen-chün as Director.
4. The Department of Traffic and Operation with Mr. Kuan Keng-lin as Acting Director.
5. The Finance Department with Mr. Hu Chi-hsien as Director.
6. The Engineering Department with Mr. F. K. Sah as Director.
7. The Railway Through Traffic Administration with Mr. Kuan Keng-lin as Acting Director.
8. The Bureau of Statistics with Mr. F. K. Mok as Director.
9. The Railway Health Service with Dr. S. M. Woo as Director.

II. Analysis of Principal Duties

Table Showing the Organization and Work of the Ministry

The Minister
- The Ministerial Conference
- The Political Vice-Minister
- The Administrative Vice-Minister

The Advisors' Office—Proposing, investigating, examining, and inspecting the plans, construction and management of Railways and National Highways.
The Counsellors' Office—Drafting, examining, deliberating on editing and compiling rules, regulations and ministerial orders.
The Secretariat—Drafting, deliberating on and safekeeping confidential correspondence, editing and translating administrative reports and documents in foreign languages, keeping records of ministerial conferences, taking care of the Library and the Museum.
The Department of General Affairs—Attending to the general affairs of the Ministry and its subordinate offices and affairs not specially assigned to other offices, departments and bureaus.
The Departments of Traffic and Operation—Attending to the traffic and operation of Railways and National Highways under the Ministry.
The Finance Department—Attending to the financial affairs of the Railways and National Highways under the Ministry.
The Engineering Department—Attending to the engineering work of the Railways and Highways under the Ministry.
Teh Bureau of Railway Statistics—Attending to the statistics of the Ministry and its subordinate offices.
The Railway Health Service—Attending to the sanitary and medical affairs of the various Railways.
The Through Traffic Administration—Attending to domestic and international through traffic arrangements and the clearing of Railway accounts.
Railway Planning Commission—Planning Railway lines of the whole country.
National Highway Planning Commission—Planning the Construction of National Highways.
Economic Committee—Making economic plans for operating and projected lines.
Editorial Committee on Railway Rules and Regulations—Drafting, deliberating on and compiling rules and regulations.
Publicity Committee—Centralizing publicity and editing official publications and statements.
Technical Committee—Studying and solving technical problems in Railway Engineering.
Committee on Standardization of Railway Technique—Determining the standard of and working out improvement on Railway technique.
Purchasing Commission—Purchasing materials for the railways.
Advisory Committee on the Unification of Railway Accounts and Statistics—Revising the Accounting Rules and Classifications, working out accounting methods, working out Statistical forms and Regulations, and summarizing other accounts.
Advisory Committee on Readjustment of Railway Obligations—Readjusting the various Railways' obligations rising out of domestic and foreign indebtedness.
Committee on Railway Personnel—Investigating the qualification of railway employees.
Committee on Railway Education—Reforming and improving on Railway education.
Committee on Railway Scholarship Abroad—Determining the number of scholarships and investigating the qualification, examining the standard and experience of scholarship holders and applicants.
Commission on Suppression of Opium Smoking—Investigating, examining and Suppressing Opium Smoking that may be addicted by Ministerial and Railway staff.
Commission on the Completion of the Lunghai Railway—Taking charge of the planning, surveying, financing and construction of the unfinished sections of the Lunghai Railway.
Commission of the Completion of the Canton-Hankow Railway—Taking charge of the planning, surveying, financing and construction of the unfinished section of the Canton-Hankow Railway.
Committee for Compiling the History of Communications—Compiling the History of Communications.
Other Committees, Commissions and Conferences.
The Shanghai Office.

A resolution passed by the Second Plenary Session of the Kuomintang Central Executive Committee last Spring appropriated two-thirds of the Boxer Indemnity Funds for Railway construction and decided that the Canton-Hankow Railway should be completed by the end of 1932. Therefore a Commission on the Completion of the Canton-Hankow Railway was established with Mr. Y. S. Chun as Chief Commissioner and Mr. H. S. Chuck as Director of Construction of the Chuchow-Shaochow Section. The same resolution further decided that the Lunghai Railway should be completed by the end of 1934. Therefore a Commission on the Completion of the Lunghai Railway was established with Mr. Kuan Keng-lin as Chief Commissioner, Mr. Ling Hun hsün as Director of Construction of the Lung-hai Railway and Mr. Ko Kuang-t'ing as Managing Director.

As a compensation to the share holders of the Canton-Shaochow Section of the Canton-Hankow Railway the Ministry has been authorized by the National Government to issue $20,000,000, bonds to redeem the shares outstanding. A Board of Trustees for the Yueh-Han Railway Redemption Bonds was organized.

Other organizations as the Advisory Committee on Railway Terminlogy and the Advisory Committee on Railway Loan Agreements have come into existence as work demands.

III. The Organization of, and the Distribution of Work in the Ministry

The Ministry of Railways plans, constructs and manages all the state railways and national highways. It supervises all the province-owned and private railways.

The Ministry of Railways is composed of:

The Counsellors' Office
The Secretariat
The Department of General Affairs
The Department of Traffic and Operation
The Finance Department
The Engineering Department
The Through Traffic Administration
The Bureau of Railway Statistics
The Railway Health Service
The Commissions and Committees.

The Counsellors' Office is composed of two Sections, the Legislative Section and the Compilation Section. This office attends to the drafting, deliberation, examination, compilation, editing, and registry of rules, regulations and Ministerial Orders.

The Secretariat is composed of three offices, the Secretarial Office, the Editorial and Translation Office and the Library. The Secretaries attend to the drafting and custody of confidential correspondence, the deliberation of official documents, the editing and translation of official publications, statements, and documents, and the records of the Ministerial Conferences.

The Department of General Affairs is composed of the Business Division, the Division of Documents and archives, the Division of Education and the Personnel Division. This Department attends to:—

1. The receiving, despatching, distribution, drafting and safekeeping of documents.
2. The issuance of Ministerial Orders.
3. The custody of the Ministerial Seals.
4. The appointment, dismissal, reward, and punishment of the staff of the Ministry and the staff of the officers under the Ministry.
5. The compilation of administrative reports.
6. The training and education of executive and technical personnel for for the Railway service.
7. The education of Railway employees and the administration of Railway schools.
8. The Ministerial estimates, budgets, accounting and miscellaneous affairs.
9. The affairs not especially assigned to other offices, departments, bureaus, committees or commissions.

The Department of Traffic and Operation is composed of the Traffic Division, the Operation Division and the Labor Division. This Department attends to:—

1. The supervision, management, improvement and development of the traffic business of the Railways.
2. The management and control of Railway operation and the rolling stocks.
3. The determination of fares and rates.
4. The domestic and international through traffic arrangements.
5. The approval of traffic equipments.
6. The working condition and protection of Railway employees.
7. The training and control of Railway police.
8. The adoption of plague-preventive and other sanitary methods in the Railways.
9. The supervision of the province-owned and private Railways.
10. International Railway problems.
11. The operation and traffic of national highways.

The Finance Department is composed of the Division of Financial affair, the Division of Audits and Accounts, the Division of Railway Obligations and the Division of Investigation. This Department attends to:—

1. The drawing up and checking of Railway estimates and budgets.
2. The control and safekeeping of Railway funds.
3. Raising funds for rehabilitation and construction of Railways.
4. The readjustment and repayment of Railway loans and obligations.
5. The auditing of Railway accounts and bills.
6. Railway accounting system and statistics.
7. The management of Railway properties.
8. The purchase and management of Railway land.
9. The conomic planning and investigation of Railways.
10. The supervision of the finance of the province-owned and private Railways.
11. Other financial affairs of the Railways.
12. The financial affairs of national highways.

The Engineering Department is composed of the Division of Civil Engineering, the Division of Mechanical Engineering and the Planning Division. This Department attends to:—

1. The supervision, management and rehabilitation of engineering affairs in the Railways.
2. The Location of Railway lines and the planning of Railway engineering.
3. The supervision and management of the engineering work in Railway construction.
4. The construction of Railway terminus and municipal construction in the Railway zones.
5. The examination in materials for civil and mechanical engineering in the construction of Railways.
6. The construction and management of Railway shops and stores.
7. The supervision of the engineering work in the province-owned and private Railways.
8. Other engineering work in the Railways.
9. Engineering work in the national highways.

In the Ministry of Railways, there shall be one Minister, one Political Vice-Minister, one Administrative Vice-Minister, two to four Counsellors, four to eight Secretaries, four Department Directors, twelve Division Chiefs, one hundred twenty to one hundred sixty clerks, one Chief Technical Expert, sixteen to twenty Technical Experts, twenty to thirty Junior Technical Experts and twenty to twenty-four Technical Assistants.

For the planning of the National Railway Network, the national highway system, the unification of Railway accounting system, the compilation of Railway rules and regulations, the purchasing of Railway materials and the standardization of Railway technique, the Ministry of Railways organizes a number of committees and commissions.

In the Ministry of Railways, the Through Traffic Administration takes care of domestic and international through traffic and Railway clearing, the Bureau of Railway Statistics takes care of Railway statistics, the Railway Health Service takes care of the medical and sanitary affairs of the various Railways.

IV. Past Records of the Ministry of Railways

The Chinese Government Railways, having suffered repeated damages from internal strife, urgently need rehabilitation. The Ministry of Railways is confronted with two tasks; namely, the rehabilitation of the operating lines and the construction of new ones. As to the former, Minister Sun Fo's policies of Centralization of Administration and Independence of Railway Accounting System serve as criteria; as to the latter, great strides have been made towards the completion of the Canton-Hankow and the Lunghai Railways. The Ministry's work in the last year may be summarized as follows:—

A.—Actual Rehabilitation

1. Cancellation of military contribution, abolition of military surcharges and all miscellaneous charges on Railway fares.

2. Settlement and liquidation of domestic and foreign Railway loans and tabulation of Railway indebtedness through purchases.

3. Settlement of Military transport accounts.

4. Organization of the Advisory Committee on the Unification of Railway Accounts and Statistics, putting the accounting Rules and Classifications at work, and adjusting the accounts of the various Railways.

5. Putting the budget system in actual operation.

6. Clearing off the corruptions of the Nanking-Shanghai and Shanghai-Hangchow-Ningpo Railways.

7. Organization of the Railway Health Service, appointing health officers to the various Railways for improvement of sanitary conditions thereof.

8. Establishment of the Railway Police Training camp to train police for the protection of passengers.

9. Establishment of the Purchasing Commission to see that all purchases be made by means of open tender and to effect real economy in Railway purchases.

10. Inauguration of the Nanking-Hangchow through Express Train Service.

11. Inauguration of the Peiping-Pukow through express train service.

12. Investigation of the bridges in the various Railways and the piles of the Yellow River Bridge.

13.—Inspection of the various Railways by Advisers and Technical Experts.

14. Investigation of the condition of the rail and sleepers of the various Railways.

15. Raising the wages of the laborers, changing the payment from a daily to a monthly basis, and raising it from $7.50 to $14 or $20 per month.

16. Prohibition of child labor—no child under fourteen years of age is to be employed by the Railways and youths from fourteen to eighteen are to be employed only for light manual work.

17. Building up a library and compiling charts and tables showing Railway working and Railway conditions.

B.—Extension and Preparation Work

1. Appointment of Directors of Construction to survey and construct the Canton-Hankow and the Lunghai Railways.

2. Surveying and investigation work in the Nanking-Canton, Canton-Hunan, and Canton-Yuannan Railways.

3. Drawing up and approval of the estimates for the construction of the Tatung-Puchow Line.

4. Appointment of specialists to maintain the road bed of the Nanking-Hunan Railway.

5. Convention of the Engineering Conference at Shanghai to discuss the plans for the projected lines.

6. Investigation of the physical geography and mining products in land 200 li around the projected lines.

7. Conducting hydrographic survey of the Yangtze River at the Wuchang-Hankow crossing for bridge building.

8.—Investigation of agricultural economy, starting from the Districts of Tai Chang and Wu Hsien in the Province of Kiangsu.

9. Getting the Nanking-Liaoning through express train service ready.

10. Unification of fares and rates by drawing up unified fares and rates tables to be effective on January 1, 1930.

11. Drafting of Railway service law.

12. Planning up-to-date dormitory and co-operative society for laborers, trial already being made in Shanghai and Changchow.

13. Establishment of the National Highway Planning Commission to draw up a program for national highway construction.

14. Investigation of the engineering, material and means of communication in the provinces and despatching investigators on economic conditions to the Province of Fukien.

V. Plans.

The future plans to be executed by the Ministry of Railways during the Period of Political Tutelage are briefly as follows :—

A.—Rules and Regulations

1. Unification of Rules and Regulations. A complete set of unified rules and regulations for all the Government Railways will be drawn up and promulgated.

2. Unification of Official Language. All the Government Railways shall hereafter use the Chinese as official language.

3. Regulation for appointment of Railway staff. Regulations governing the appointment, qualification, salaries and treatment of the Railway staff will be drawn up. The examination system will be gradually applied.

B.—Finance

1. Adjustment of Railway Indebtedness. A thorough examination of the indebtedness and the financial condition of the various Railways will be made. Plans for financial readjustment will be drawn up. The creditors of the Railways will be consulted in the actual execution of these plans.

2. Revision of Loan Agreements. A careful study of the existing loan agreements will be made. Principles in the contracting of loans will be worked out. Negotiation to revise the loan agreements which contain provisions that are contradictory to the principles or impose on the Railways unequal and inequitable obligations will be made. All loan agreements on Railways which are not yet constructed shall be nullified. Agreements of political loans made in the name of the Railways shall be revised.

3. Improvement of the Railway Accounting System. All Railways shall submit estimates and budgets to the Ministry for approval. A unified system of accounting shall be adopted. The Advisory Committee on the Unification of Railway Accounts and Statistics was reinstituted to carry out this policy.

C.—Traffic and Operation

1.—Revision and Unification of Fares and Rates. In view of the close relationship between the Railway fares and rates and the common welfare of the people, the Ministry of Railways organized the Advisory Committee on Fares, Rates and Classification of Goods for the purpose of unifying the fares and rates of the various Railways. But, although it is easy for the Ministry to classify the goods, determine their names and fix a rate for each, yet the cost of construction in each Railway, its history, the productions of different places, and their prices and market conditions vary. Hence, for the time being, only a uniform rate for passenger traffic (one cent per kilometre) can be fixed. The next step towards uniformity will be a uniform rate for goods in the various districts and the final one will be a uniform rates for the whole country.

2. Revision of the Train Time Tables. Hitherto, time tables were drawn up by the individual Railways themselves. Consequently, connections were not well made and through traffic was not well arranged. The Ministry plans to make the time tables in such a way that connections between the various Railways will be well made and through traffic will be best arranged.

3. Improvement of Working Conditions for Railway Employees. A thorough investigation of the living condition of the Railway employees will be made. Index numbers of wages and living standard will be worked out. A mimimum wage will be fixed so as to raise the standard of living of the employees. At the same time, general education and technical training will be given to them. Also, co-operative societies will be organized, model village built, compulsory savings made and employment insurance policies purchased for the employees.

4. Through Traffic Arrangements. An annual conference for through traffic for the purpose of improving and extending through traffic arrangements in the country will be resumed. For international through traffic, the Fifteenth China-Japan Through Traffic Conference will be called, the Euro-Asiatic and the China-Japan-America through traffic arrangements will be made. Other through traffic services as those with marine and highway transportation will also be taken up.

5. Centralization of Railway Purchase. At the organization of the Purchasing Commission, all Railway purchase of locomotives, cars, steel rails, sleepers, bridges, machinery, steam or motor boat, and electric poles shall be handled by the Commission. All purchase of fuel, metal, electric material, cement, timber, oil and paint, asbestos, uniform, stationery, and printed matter amounting to $5,000 or above shall also be handled by the commission. Purchases of between $2,000 and $5,000 shall be made by the Commission upon the approval of the Ministry. Purchases of $2,000 or less may by made by the Railway Administrations. The Commission is making a study of the annual consumption of materials by each Railway. Long term contract in purchase will be signed by the Commission. Plans to establish metal shops and creosoting plants are already in progress.

D. Engineering

1. Repairs of Damaged Lines and Machines. The Government Railways and their equipment have suffered great damage

in the recent internal strife. Many Repairing Plants are now working full time. It is expected that the necessary repairs are made in the shortest possible time.

2. Improvement and Increase of Equipment in the Peiping-Suiyuan, the Peiping-Hankow, the Tientsin-Pukow, the Peiping-Liaoning and the Lunghai Railways. As the above mentioned Railways are the principal trunk lines of the country, traffic increases steadily. Equipments like the improvement of bridges and rails, the increase of locomotives and cars, the change of the new sleepers and the improvement of the telephone and telegraph systems etc. must be effected to meet the rising demands.

3. The completion of the Canton-Hankow, the Shanghai-Hangchow-Ningpo and the Lunghai Railways. A resolution of the Second Plenary Session of the Kuomintang Central Executive Committee decided to have the Canton-Hankow Line completed in 1932 and the Lunghai Line completed in 1934. Construction Bureaus for the execution of this resolution were established. It is expected that the completion will take place at the scheduled time. Plans for the completion of the Hangchow-Peikuan Section of the Shanghai-Hangchow-Ningpo Railway are also in full progress.

4. Establishment of Locomotive Works and other Factories. Although the Repair Shops of the various Railways can, under ordinary circumstances, take care of all the repairs, but the lack of funds has left a great deal of maintenance and repair work undone. Some of the shop were even closed down. The first step in solving this problem is then to put all these shops back to full time work. The second step is to improve and expand these shops. But in as much as this is a question of economy, the questions how much they should be improved and to what extent they should be expanded can not be settled as yet. A study of the conditions and possibilities is now being made. It is expected that a bridge building plant will soon be built in Wuhan for the manufacturing of standard bridges to supplant the old bridges of the operating lines and supply bridges for new lines.

5. Location and Construction of the Railway Net. As a first step towards the construction of the national Railway Net, the Ministry of Railways drew up a plan to use the Boxer Indemnity Funds and the Custom Surplus in the construction of Railways. The plan was adopted by the Central Political Council with minor changes. The Second Plenary Session of the Kuomintang Central Executive Committee adopted a resolution to complete the Canton-Hankow and the Lunghai Railways and to construct the Sinkiang-Kansu-Suiyuan Railway. Survey in the Nanking-Canton, the Canton-Yunnan, the Hunan-Yunnan, the Foochow-Nanchang, the Shaochow-Nanchang, the Paoking-Chinchow and the Chungking-Liuchow Lines will be finished in the near future. This plan (except the unfinished sections of the Canton-Hankow and the Lunghai Railways) including the Sinkiang-Kansu-Suiyuan Lines embodies the construction of 10,000 miles of Railways which would cost $1,214,000,000. It takes some time to raise such a great sum of money. The Ministry can at the present begin work on the Sinkiang-Kansu-Suiyuan and the Tsang-chow-Shihkia-chuan Lines. The Construction of other lines will begin in accordance with its order in the plan of the Minister.

6. Construction of National Highways. The Plan for national highway construction includes two kinds of highways; namely, the Ministry lines and the national defense lines on the borders. The total length is 67,000 li. The total cost would amount to $364,000,000. The whole program will be carried out in four periods. The financing will be taken care of by the appropriation of tax revenues and the issuance of bonds and notes. A complete and comprehensive plan for financing has been worked out and sent to the Legislative Yuan for approval. At present no time is lost in raising money for the first period's work which will require about $80,000,000 for 16,000 li of highway. When this is completed, work in the later periods will be taken up.

VI. Publications of the Ministry

A.—Periodicals.
1. The Railway Gazette (tri-daily)
2. The Ministerial Report (monthy)
3. Statistics of Railways (annual)

B.—Special Publications.
1. A Resolution to Use the Boxer Indemnity and Custom Surplus for the Construction of Railways (Proposed by Minister Sun Fo before the Kuomintang Central Political Council)
3. Table Showing the Annual Distribution of Work During the Period of Political Tutelage.
4. Economic Condition along the Nanking-Canton Railway.
5. A Plan to Use the Boxer Indemnity and the Custom Surplus for the Construction of Railways.
6. A Plan to Construct a National Highway System by Periods.
7. A National Highway Net-Work.
Standard and Regulations for National Highways.
Principles of Operation in National Highways. (The above three publications are bound into one single volume)
8. General Regulations for the Operation of Passenger Cars.
9. General Regulations for the Operation of Freight Cars.
10. Operating Statistics.
11. Mr. Mantell's Reports. (There will be altogether nine reports, one being a general report and one on each of the following Lines, (*a*) The Nanking-Shanghai and Shanghai-Hangchow-Ningpo Railways, (*b*) The Peiping-Hankow Railway, (*c*) The Peiping-Suiyuan Railway, (*d*) The Kiao-Tsi Railway, (*e*) The Canton-Hankow Railway, (*f*) The Canton-Kowloon Railway, (*g*) The Tientsin-Pukow Railway and (*h*) The Peiping-Liaoning Railway.)
12. Mr. Poland's Reports on Railway Finance.

Note: Publications of the various Railway Administrations are not included.

Mitsubishi Takes Over Westinghouse in Japan

THE rapid development of Japanese electrical manufacturing enterprises turning out plant and equipment meeting every requirement of the national demand, except in the very largest units, is gradually closing the market in that country for foreign materials. The Mitsubishi Electrical Company, The Shibaura Engineering Works and the Hidatchi Engineering Works, together with several lesser manufacturers, have developed their plants and outputs to the point where under a little more favorable export conditions, they will be able to compete successfully in Asiatic markets with foreign manufacturers. A sign of the times is the announcement that the Westinghouse Electric Company of Japan ceased to accept new business and began liquidation on January 1. From then its business was taken over the Ryobei Denki Shokai, a newly-created subsidiary of the Mitsubishi Denki Kabushiki Kaisha, with which the Westinghouse Company of Japan has long been affiliated.

"Japan is rapidly becoming self-sufficient in the manufacture of electrical machinery," declared Mr. J. W. White, managing director of the Westinghouse Company of Japan, in explaining the reason for the new arrangement. "The only need for further importations of foreign electrical machinery is in the field of specialties, large machines and new inventions, for which the demand in Japan is so small that they cannot be produced by mass production and hence cannot compete with the imported articles.

"The Westinghouse Company of Japan has long realized the country s approach to self-sufficiency in this respect and has worked toward that end. Our association with the Mitsubishi Denki Kabushiki Kaisha has been mutually highly satisfactory and the new arrangement will be merely an extension of that association.

"There will be no difference to our past customers. The new company will occupy our present offices and about 75 per cent. of our staff will go over to it. The only part which will not be taken over is the clerical organization, whose work will be done by the clerical organization of the Mitsubishi interests."

The Ryobei Denki Shokai with have exclusive rights of importing Westinghouse products into Japan and will carry large stocks of these products, taking over the Westinghouse warehouse in Yokohama and its retail store on the Ginza. The articles handled will be chiefly Westinghouse importations with the addition of allied lines of which the Westinghouse Company of Japan has been the agent here in the past.

The new company will have a paid-up capitalization of Y.1,000,000 and will be under the complete control of the Mitsubishi Denki Kabushiki Kaisha, of which the present officers of the Westinghouse Company of Japan are shareholders and of which Mr. White is a director.

Although the Westinghouse Company of Japan ceased taking new business on January 1, it will continue to function until liquidation has been completed and its present contracts fulfilled. This is expected to take the larger part of a year. Its present staff will continue to handle this work and will gradually change over to the new company as it is completed. The foreign members of the present Westinghouse staff will continue as advisers to the new company. The same arrangement applies to the company's offices in Osaka and Dairen.

China and the Health of the World

By *GEORGE E. SOKOLSKY*

DURING the past year, Chinese sanitary officers of the Greater Municipality of Shanghai have protested against the action of American health officials in forbidding passengers on ships embarking for the United States to enter the United States unless certified free from infection of meningitis by the American Health Officer in Shanghai. The Chinese officials regarded the American decision as a slight upon themselves, upon their ability and upon the sovereignty of their country. The United States simply replied that meningitis was becoming epidemic on the west coast of the United States and that the source of infection had been traced to Manila and Shanghai. The United States would preserve the health and lives of its citizens even if it had to cast aspersions at the abilities of Shanghai sanitary officials.

Dr. J. H. Liu, Minister of Health

Now, it so happens that the Commissioner of Health of the Municipality of Greater Shanghai is Dr. Hu Hung-chi who is recognized as an expert in his field and an administrator of outstanding ability. Surely, the representative of the American Public Health Service in Shanghai, Dr. T. B. Dunn, would be among the first to recognize that a certificate issued by Dr. Hu was worthy of recognition. Dr. Hu's pique at the American Government was wholly unjustified, for what the United States had to recognize was not Dr. Hu's certificate, but the fact that China had no modernly organized health service, no vital statistics, no accurate knowledge of epidemic conditions and no preventative service. China, from the standpoint of world health, often becomes a plague spot and a menace and therefore stringent protective measures must, from time to time, be taken against her. With communications speeded up, as they now are, the size of the world is constantly shrinking and plague conditions in one port immediately affect the entire world. China cannot place herself in the position of having all ports closed against her.

From this standpoint, the following announcement is of even greater importance than the mandate on the abolition of extraterritoriality, issued almost simultaneously. For whereas the mandate on the abolition of extraterritoriality is a political gesture of exceedingly doubtful authenticity, the health pronunciamento is a significant movement in the direction of China's assumption of equality among the nations of the earth. Chinese protagonists are prone to talk about their rights, but they seldom even think about their responsibilities and obligations. The health announcement is a definite assumption of responsibility and the recognition of an obligation. It means that China will do her part in keeping the world free from epidemics, but more important, it means that the National Government will do something concrete towards the protection of the lives of her own people, who are wiped out more by disease than by famine and more by famine than by civil war. But even that is a guess, for without vital statistics, how does one know accurately, the rate of increase or decrease of the population of China and the causes of either the increase or the decrease ?

The Health Statement follows :

> The Chinese Government, after consultation with the members of the League of Nations Health Mission, has made definite proposals for collaboration between China and the League in health matters.
>
> On December 24, the Executive Yuan approved the plan of work submitted by the Minister of Health, in which these proposals for collaboration with the League are embodied. The Minister of Finance has agreed to appropriate the funds necessary to give effect to the Minister's plan of new health work in China. The Minister of Health is going to Geneva in February to attend the session of the Health Committee of the League, when the proposals for collaboration will be discussed, as is required by the constitution of the League.
>
> The Health Committee is an advisory organ of the Assembly and Council of the League of Nations. It is composed of the chiefs of health services of the most important countries. It will report on the Chinese proposals for collaboration in health matters to the May session of the Council of the League, to which a Chinese representative will be invited to sit as a member during the discussion of this report.
>
> In the meantime a number of Chinese leaders in medicine and public health have been invited to participate in the work of the Health Organization of the League. These include Dr. Tsu Min-yi, who is an expert on physical education, Dr. F. C. Yen, Dean of the Central University Medical College, Dr. Robert Lim, Professor of Physiology at the Peiping Union Medical College, and President of the National Medical Association, and Dr. Shisan C. Fang, former Director of the National Epidemic Diseases Prevention Bureau.
>
> The Secretary General of the League has appointed Dr. Tsefang F. Huang, of the Ministry of Health and former Commissioner of Health of Hankow and of Peiping as a member of the Secretariat of the League.
>
> A number of Chinese health officers who will be utilized by the Ministry in its new program of work will be given the opportunity of receiving special training abroad at the expense of the League, beginning early in 1930.
>
> It will be recalled that the Assembly of the League, during its September session, voted a special fund to be utilized for collaboration with China in health matters (Fellowships, Special Studies by experts, etc.).

The Minister of Health, who completed these negotiations, had modestly kept his name out of the above notice. Dr. J. H. Liu is an administrative and not a political minister, which gives him the tremendous advantage of knowing what the people of his country require without forcing him to consider the intellectual peculiarities of a constituency. He has had a long and varied career in the field of public health in China, where this work is at its inception. Dr. Liu was graduated from the Harvard Medical School in 1915. Returning to China, he became associated professor of the Harvard Medical School of China in 1916. In 1918, he joined the Peking Union Hospital as an assistant surgeon, becoming an associate professor the following year. In 1924, he became the chief of the clinical department of the P.U.M.C., which position he held until 1928 when he became Vice-Minister of Health of the National Government.

The representative of the League of Nations who gave Dr. Liu the moral support necessary for this work was Dr. Ludwik Rajchman, head of the Public Health Section of the League of Nations and a medical administrator of vast experience. There can be no doubt whatsoever that the plans which will be announced in Nanking and Geneva during March or April of this year will be carried through to success, for they are practical plans, limited in scope to the capacity of the Ministry of Health and the existent medical profession in China. This work is so fundamental that it should be regarded with the utmost seriousness by Chinese officials, even those who cannot understand what it is all about, because in due course they will all realize, as politicians in other countries realized, that a healthy nation is more likely to be respected and self-respecting than a country whose ports are constantly being advertised as a source of international infection.

Now, one easily moves from this topic to the general consideration that it is very difficult to do any constructive work in China or in any other country unless there is a free and shameless recognition of error. If any nation is perfect, there is nothing to correct and naturally such countries soon enter upon a state of decay. The Chinese have become so sensitive to criticism that one would almost believe that they assume that they have achieved a state of perfection (which means, of course, death), except for the saving grace of a natural sense of humor which one knows is there, because it is so obvious in every day life.

When, for instance, Shanghai or Tientsin or any place in China is declared to be a cholera-infected port, no criticism is being leveled at China's 4,000 doctors or 300 hospitals (if there are that many), nor is there the slightest imputation that China's sovereign rights are not sovereign, but rather that cholera is on hand and that Japan, Canada, the United States and other countries, to which ships from China go, prefer to keep cholera out of their countries. Similarly, when the pneumonic plague raged furiously in Manchuria and Mongolia, Russian health officials became chary of Chinese in their territory. But Dr. Wu Lien-teh's North Manchurian Plague Prevention Service clearly showed what could be done to isolate, minimize and eventually to annihilate a plague and surely Dr. Wu's services to China and to the world are of greater importance than that of any or all the military men whom this nation has produced during the past 18 years.

What Dr. Wu did in Manchuria, Dr. Liu and Dr. Hu will do in the Shanghai region with cholera and the Summer diseases and other Chinese doctors will do elsewhere. The capacity of a Chinese doctor to serve his countrymen and to keep the nation self-respecting in matters of health is limited, not by extraterritoriality or any political concepts, but by the education and experience of the doctors and the willingness and ability of the Government to provide them with the funds to do their work scientifically and honestly.

Wherever there is a Municipality in China, there is supposed to be a Commissioner of Health. From casual observation, these Commissioners of Health are above the average as administrators. This is not surprising, for doctors are likely to be better educated than most officials in China and the men who are willing to be better educated than most officials in China and the men who are public health officers are idealists who are prepared to give up lucrative professions for a principle. It is much easier to make a living from injections than from statistics in China and the man who is prepared to devote himself to statistics must be a decent and public-spirited citizen to start with, which gives him a tremendous advantage over a likin collector, for instance, who is an official only because it brings him more money than he could make if he were a compradore. But these doctors naturally suffer from their inability to play politics, for they went into this work not for politics but for public health. The result is that very often they are left without funds, as I am told the Commissioner of Public Health in Tientsin has been, by officials who cannot understand why he should spend money on keeping people alive.

It is curious that the Chinese have disregarded the fact that Soviet Russia, in seeking to erect a state on the ruins of Mongolia, discovered that the greatest weakness of the Mongols was disease which was constantly reducing the population. Disease and the peculiar religion of the Mongols made the descendants of Ghengis Khan, from a standpoint of national importance, a conglomeration of nomadic tribes which did not matter at all. Now they do matter and that in a very short period of a decade since the Russians have been preaching health. If they matter too much, China will be faced with a very serious problem on her Northeastern and Northwestern frontiers. This is as much a question of public health as it is of politics, for the healthier nation will survive, no matter who has more money.

Finally arises the question of equality. It is difficult to make any Chinese realize that equality is a social and not a political question. Many foreigners who pretend to be friends of the Chinese people favor political but not social equality, because political equality affects them only in the abstract, while social equality hurts their pride. These prejudiced foreigners may make lengthy speeches and write powerful articles favoring the abolition of extraterritoriality but they will not recognize the social equality of the Chinese because they stupidly believe that no one can be equal to the so-called white races. Although they laud China, they do not respect the Chinese.

It is respect that China wants rather than praise, for even a parrot can praise but respect must come from the heart. It is this that so few Chinese can understand. Now, it becomes increasingly difficult to respect the intellectuals of China who permit their country to be maligned not by enemies but by facts. After the publication of the American Red Cross Report on Famine Conditions in China, no Chinese group undertook to remedy the conditions indicated. Instead, the very faults to which the Red Cross called attention were continued and the evils arising from them increased. It is such *facts* which do China damage abroad because they lessen the respect of other nations for China. When, on the other hand, the Ministry of Health, sets to work to do a constructive job for the relief of this country and therefore the world from the menace of epidemics arising in China, then China benefits therefrom throughout the world, because universal respect for China is increased. A mandate declaring extraterritoriality abolished may appear to be bright and clever and a keen minicry of little Turkey, but it gains no more respect for China than any tricky act would, but when constructive work is done, then all the world knows from facts that a new China has arisen.

Book Notes

THE CHINA YEAR BOOK, 1929-30, edited by H. G. W. Woodhead, C.B.E. Tientsin Press Limited, Tientsin.

The twelfth edition of the China Year Book maintains, in its 1,200 pages, the standards and traditions of previous issues. It is truly an "encyclopaedia of information concerning China." In fact, it is difficult to deal with any problem concerning this vast country without reference to the China Year Book, which has for so many years been the only authoritative book on every subject.

The China Year Book differs from most books of this type in that it does not limit itself to mere short paragraphs of almanac information but has especially compiled lengthy studies, some of them almost books in themselves, on the most important phases of activity in China during the preceding year. Especially notable among such studies are the chapters on Mines and Minerals by Dr. W. H. Wong of the Geological Survey of China; Public Health and Medical Events during 1927 and 1928 by Dr. J. B. Grant of the Rockefeller Foundation; Currency and Banks by Mr. E. Kann, a financial expert in Shanghai; Labor in China by George E. Sokolsky, editor of the *Far Eastern Review*, who also prepared the chapter on the Kuomintang; the Army and Navy by General Wang Ken, a West Point graduate; etc. The Chinese Eastern Railway problem is brought up-to-date in a special chapter. There is a valuable Who's Who in China prepared by Dr. M. T. Z. Tyau, Director of the Intelligence and Publicity Department of the Ministry of Foreign Affairs. This latter chapter is particularly important because it is the only place where the names, biographies and offices of the most important Chinese in the country are accurately given without partisanship or miserable laudation which usually lessens the value of the sketch.

Altogether, the China Year Book is a marvellous institution which should have universal support because it is an absolutely necessary compendium for every person who desires to work in or write about China. To the business man, it is invaluable; no student can do without it.

Japanese Investments in China

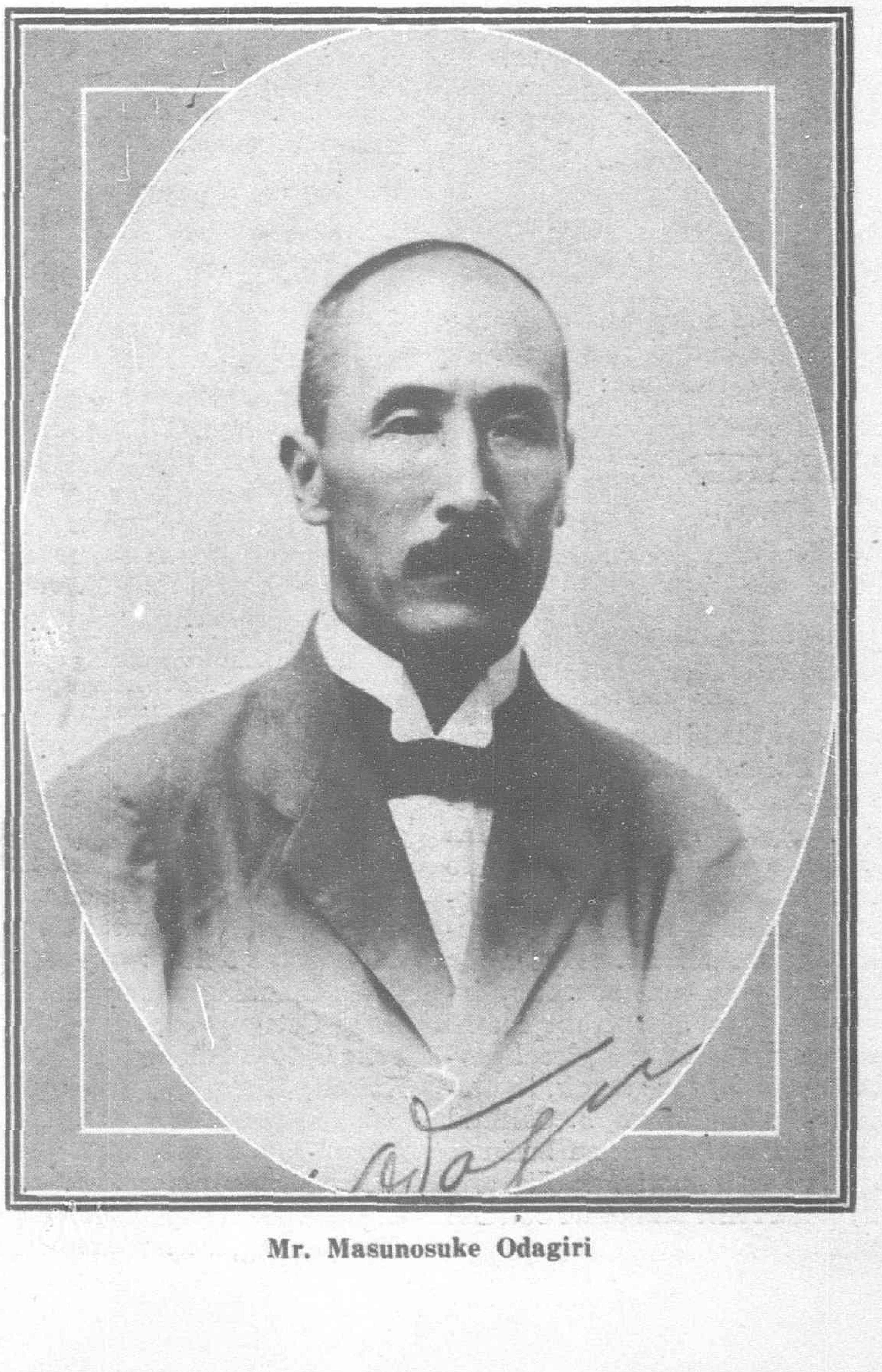
FOREWORD :—The recent announcement that the Japanese loans to the Hanyehping Company have been transferred from the Ministry of Finance to the account of the Imperial Steel Works at Yawata, reveals that the total sum advanced to date, with interest, approximates Y.50,000,000. For many years these loans have been carried as a charge on the Government, but Mr. Inouye, the Finance Minister, has finally had them transferred to the Government steel works to be carried as a purely business proposition between the two enterprises directly concerned.

There has been so many conflicting statements in regard to Japanese investments in China, that a comprehensive survey has long been needed to throw light on this subject. One of the outstanding achievements of the Institute of Pacific Relations is the work of its research department in gathering and publishing data on foreign investments in China. A co-operative investigation into the problem was arranged for and the following preliminary papers were to be prepared for the Kyoto Conference ;

1. *British Investments in China* by T. E. Gregory, Professor of Public Finance, University of London and Dennis H. Robertson, Lecturer in Economics, University of Cambridge.
2. *Japanese Investments in China* by a committee of Japanese economists.
3. *Foreign Investments in China* by D. K. Lieu, Director of the Bureau of Census and Statistics, Nanking.
4. *American Investments in China* by C. F. Remer, Professor of Economics, University of Michigan.
5. *French and German Investments in China* by C. F. Remer.

All of the above papers with the exception of the first, were prepared and circulated at Kyoto. The failure of the British committee to complete its task in time, is to be regretted, as the absence of this data makes it difficult to present any intelligent analysis of the subject as a whole. The only approximate estimate of the aggregate British investments in China worthy of consideration as authoritative, is the statement of the Chairman of the Chartered Bank of India, Australia and China in his annual address to the shareholders in 1926, in which he placed the total at £350,000,000 or $1,750,000,000.*

Of the above papers submitted to the Kyoto Conference, the report of the Japanese committee is by far the most complete and authoritative. The paper is signed by Mr. Mannusuke Odagiri, Director of the Yokohama Specie Bank in charge of its China branches and business. Mr. Odagiri has also officiated in the past as the representative of the Japanese Financial Group in the various international consortiums that have been formed to finance China. He stands to-day as the foremost authority on Japanese investments in China, one of the very few experts in the world of finance competent to sit around a table and discuss China's financial problems. His contribution on the stake of his country in China is therefore of the greatest value.



Mr. Masunosuke Odagiri

If we accept the figures of the Chairman of the Chartered Bank as a fairly accurate estimate of British investments in China, it will be seen from Mr. Odagiri's report that Japan's stake of Y2,797,000,000 (roughly $1,400,000,000) is only $350,000,000 less than the British.

There are several estimates of American investments in China. Professor Remer places the missionary investment at $50,000,000 with an annual expenditure for upkeep of $10,000,000, including the Rockefeller Institute. These figures seem to be incomplete and we are inclined to set them at $15,000,000. The American commercial stake is placed at $100,000,000, to which must be added the $50,000,000 invested in the Shanghai Power Plant. This makes a total of $200,000,000.

These investigations reveal that British investments in China are eight times and the Japanese seven times greater than the American. It is noticeable that Mr. Odagiri does not unduly emphasize Japan's contributions to cultural work, nor does he give any definite information as to the amounts annually expended to maintain these philanthropic undertakings. The South Manchuria Railway Company has expended more than G.$80,000,000 in the last 21 years on public services, of which G.$15,500,000 was for hospitals and schools. For the fiscal year ending March 1928 about G.$4,000,000 was allotted for education and hospitals. In addition to this, there is a fund of G.$1,500,000 set aside from the Boxer Indemnity Funds for similar purposes. It may be fairly said that Japan spends about G.$6,000,000 a year as an investment in Chinese Good-will. If we exclude purely missionary expenditures, it will be found that the Japanese are spending more for cultural work in China than the Americans, but they don't include these sums as capital investment. At the best, it is a philanthropy, and they let it go at that.

* * *

In making a survey of Japanese investments in China, the reader is reminded of the fact that our contact, racially and culturally, is of very ancient origin and the relationship ramified in the extreme. Any mere putting together of investment figures in terms of physical or monetary standards of value will, in many instances, scarcely do justice to the real magnitude of the interests and connections Japan has in China.

This review, however, will not deal with any long history of Chino-Japanese relations, but its scope will be restricted to business investments in the modern sense of the word. It should be borne in mind that it was only after the conclusion of the Shimonoseki Treaty of 1895 that Japanese investment activity has witnessed an epochal expansion. Let us glance at the history of the foreign trade activity of Japan, England and America in China in the following table which gives import and export figures of these trade leaders in every tenth year : (in 1,000 H.K. Tls.)

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*Dollar quotations in United States Currency.

Japan, England and America Trade With China

	Japan		America		England		Hongkong	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
1870	1,286	2,481	374	7,599	24,181	29,027	19,175	10,161
1880	3,501	2,203	1,205	9,107	21,881	27,824	30,253	16,609
1890	7,389	4,832	3,676	8,165	24,608	13,095	72,057	32,931
1900	25,753	16,938	16,724	14,752	45,467	9,356	93,847	63,962
1910	76,756	61,606	24,799	32,289	70,949	18,703	171,469	108,723
1920	229,136	141,928	143,199	67,111	131,720	45,805	159,313	136,462
1928	319,293	228,602	205,541	127,205	113,759	61,064	226,077	182,124

It will be seen from the above that the China trade activity of various nations of the world has expanded and multiplied in an amazing fashion during the decade ended in 1900. Two factors are pre-eminently accountable for this development. One is an accelerated industrial expansion in these countries and the other is that an increasing number of Chinese ports were opened to foreign trade.

In keeping with the increasing importance of China in the world map of trade its chief centers have come to be provided with facilities of all sorts which are essential for active business transaction. Consulates and chambers of commerce were established one after the otehr. Financial institutions were springing up there and numerous shipping companies opened up China services. A countless number of industrial and trading firms were started and as many concerns were locating their branch offices in China with the result that the number of resident foreigners gained at a remarkable pace. Such a turn of affairs naturally stimulated the tendency for an ever increasing amount of foreign capital being directly or indirectly invested in China. In this respect the following table comparing the number of foreign business firms in China before and after the World War and at the present time may throw some light :

	1913	1921	1927	
	Number of firms	Number of firms	Number of firms	Foreign population
Japan	1,269	6,141	4,848	201,721
England	590	703	617	11,714
America	131	412	551	6,970
France..	106	222	171	2,588
Germany	296	92	307	2,719
Russia	1,229	1,613	595	68,097

The numerical superiority of Japanese business establishments in China as shown above of course does not go to indicate their corresponding position in relative economic strength. The fact that there was a sharp gain in the number of Japanese business establishments in China during the World War and a slight decline immediately after is attributable to the unfit being weeded out during the post-war depression.

The following record of foreign shipping entry and clearance from the ports of China may prove of interest as it gives a clear idea about the commercial relations of the various nations :

	1913		1925		1927	
	Vessels	Tonnage	Vessels	Tonnage	Vessels	Tonnage
Japan	22,716	23,422,487	27,261	35,081,116	27,105	35,745,535
England	32,186	38,120,300	36,937	42,942,484	33,791	40,258,049
America	2,458	898,750	5,608	5,859,851	4,844	5,577,115
France	1,020	1,232,763	1,915	2,008,834	1,504	1,894,614
Germany	5,382	6,320,466	604	2,486,057	955	3,260,717
China	42,617	18,628,456	44,734	29,908,706	35,937	18,218,215

Note : The above figures comprise the number of ships and their tonnages of the various nations engaged in foreign as well as coast-wise trade.

We have so far made a brief study of the history of trade relations of Japan and other nations with China in recent years. We shall presently examine what is the outstanding amount of investments which Japan has made during these years of increasing China trade activity. In viewing this subject it may prove convenient to classify Japanese investments into three categories by their character. I. Business Investments. Direct capital investments by Japanese business men, corporations and industrial interests. By far the most important of the three in point of the amount of money involved and their economic significance. 2. Loans. These represent Japanese financing of the Central Government of China, local governments and individuals, indirect investments, so to speak, to provide a background to Japanese enterprises in China. 3. Cultural Investments. Belong to entirely different category from business investments in that the former have for their motive facilitating education, science and art, sanitation, social relief and other cultural activities.

1. Business Investments

Because of the historical and geographical reasons described before, the Japanese population and the number of Japanese corporations and other business establishments in China are of considerable proportions, their theater of activity is diversified, and their geographical distribution is widespread. This fact makes it almost an impossible task to compile authentic figures of investments based on first hand information. The South Manchuria Railway Company some time ago conducted an exhaustive investigation of investment conditions in Manchuria, but no similar attempt has ever been known to have been conducted for China proper. The following statistics have been compiled from data furnished by business corporations, and banks in China and other authoritative sources of information and we are of the conviction that they represent about the most dependable figures at present available. These figures necessarily will be subject to correction as further progress is made in the investigation of conditions of our financing activity in China. Business investments as classified by various groups standing as follows :

Total business investments	Y.1,809,154,000
General trading	162,860,000
Manufacturing	144,941,000
Banking and trust	256,332,000
Railway, transportation, warehousing ..	650,152,000
Civic engineering, construction	31,708,000
Agriculture, mining, forestry	206,695,000
Spinning and weaving	250,645,000
Electric, gas	47,211,000
Marine products	1,810,000
Other	56,800,000

We will explain briefly the more important items on the above list.

1. Railway, transportation, warehousing, etc. By far the most important in this group is the South Manchuria Railway Company's enterprises.

The company operates 600 miles of railways involving Y.400,000,000 in capital investments, as it has Y.150,000,000 capital locked up in its subsidiary enterprises. Further Y.100,000,000 represents the aggregate capital invested by private companies in their transportation and storage undertakings.

2. The spinning and weaving industry ranks second, being surpassed only by railway and transportation in point of invested capital. It has Y.250,000,000 invested as will be seen from the following figures :

Mills in :	Spinning spindles	Twisting spindles	Looms
Shanghai	1,020,096	145,584	8,302
Tsingtow	256,192	6,160	1,742
Manchuria	101,756	680	504
Hankow	42,816	—	300
Total	1,420,860	152,424	10,848

The first cost of cotton mills inclusive of operating funds ranges all the way from Y.130 to Y. 150 and occasionally Y.180 per spindle. Old or new type of machinery and equipment installed and the age of mills are the important factors for the varied cost figures per spindle. Based on the market value at the time of construction Y.150 was used as a fair average per spindle cost, one-third for twisting spindle and Y.700 for loom. Accordingly the following figures were derived :

Investment for spinning spindles	Y.213,129,000
do. for twisting spindles	7,621,200
do. for looms	7,593,600
Total	Y.228,343,800

In other words, cotton spinning and weaving investments aggregate Y.228,000,000 in round figures to which Y.22,000,000 has to be added for the first cost and further disbursements on spun silk mills, linen spinning plants, etc., or a grand total of Y.250,000,000.

The more important Japanese spinning firms having mills in China are as follow : In Shanghai, the Naigai Wata Kaisha, Japan-China Spinning and Weaving Company, Kung Ta Cotton Mill, Ta Kang Cotton Mill, Shanghai Cotton Manufacturing Company, Yü Feng Cotton Mill and 30 odd mills. In Tsingtao, the Naigai Wata Kaisha, Kung Ta, Ta Kang and other cotton mills. Including establishments located in Hankow, Tientsin and Manchuria they run up to a total of more than 50. While most of those located in China proper are cotton spinning mills, those in Manchuria are engaged in highly diversified lines ; cotton spinning and weaving, silk spinning, linen manufacture, woollen and worsted fabrics, etc.

3. The investment conditions of financial institutions are difficult to ascertain. The following list comprises the leading concerns which are active in this field :

	Capital stock Yen	Main office	Year Established	Lines
The Yokohama Specie Bank ..	100,000,000	Yokohama	1880	Foreign exchanges, general banking.
The Bank of Taiwan	15,000,000	Taihoku	1899	Development of natural resources in Taiwan, South China, South Sea islands, investments therein.
The Bank of Chosen	40,000,000	Keijo	1900	Development of Chosen, Manchuria, Mongolia.
The Exchange Bank of China	10,000,000	Peking	1918	Japanese-Chinese joint enterprise for banking, investment.
The Shoryu Bank ..	12,000,000	Dairen	1908	General banking.
The Industrial Bank of Japan ..	50,000,000	Tokyo	1902	Issues industrial debentures, investment, banking.
East Asia Industrial Co.	20,000,000	Tokyo	1909	Financing enterprises in China.
Sino-Japanese Industrial Development Co. ..	5,000,000	Tokyo	1913	Industry, investment.
Oriental Development Co. ..	50,000,000	Tokyo	1908	Foreign investment
Japanese banking group			1917	Formed by the Bank of Taiwan, the Bank of Chosen and the Industrial Bank for China investment during the World War.
Banking syndicate for foreign investment			1918	A China investment combine of 1918 formed by 18 leading banks of Tokyo and Osaka.

In addition to these institutions, Mitsui, Mitsubishi, Okura and other interests are taking an active part in the domain of industry and finance of China.

4. Manufacturing industry other than spinning. We enumerate below the leading branches of manufacturing industry other than spinning and their approximate investment.

Lumber working. Y.20,000,000. The main seat of operation of this industry lies in the vicinity of Antung along the lower Yalu and the highlands of North Manchuria centering round Kirin.

Oil extracting. Y.20,000,000. Dairen is the center of this industry with many other points in Manchuria having lesser shares in the activity. Raw materials used are soya beans and cotton seed. In Tsingtao these oil pressing mills use peanuts which are produced there in abundance. In the central Provinces this industry thrives using cotton seed. Szechwan is famous for its China wood oil manufacturing.

Sugar refining. Y.6,000,000. The Miji Sugar Refining Company owns and operates its Minghua Sugar Company in Shanghai and in Mukden, Manchuria, there is the South Manchuria Sugar Refining Company.

Ceramic industry. Y.8,000,000. The largest in this group is the Dairen Ceramic Industry Company. Numerous companies are engaged in the manufacture of glass and glass ware, fire brick, cement, roofing tiles, water-jars and various earthen ware and procelain products. Outside of Manchuria, Shanghai has a glass manufacturing company.

Safety match manufacturing. Y.4,000,000. This industry is developing in Tsingtao, Tientsin, Tsinan, Kirin, Changchun, etc.

Tobacco manufacturing.Y.10,000,000. Raw materials for this industry are leaf tobaccos of species native to China, tobacco from America or American type leaves grown in China. Manufacturing plants are located in Yingkow, Tientsin, Mukden, Shanghai, etc., active investment in this industry dating from 1906.

Paper manufacturing. Y.6,000,000. Investment activity for these enterprises was started in 1919, along the River Yalu, and in 1921 they were active producers. The immense timber resources in the Yalu basin are being tapped for the manufacture of pulp and various descriptions of paper.

Ice making. Y.2,000,000. Demand for ice for long cold storage or for long haul in refrigerator car or steamer of marine products is developing is sympathy with the increasing fishery activity. The recent gain in the Japanese population in Manchuria, a growing traffic in Shantung beef to Japan proper and an expanding export trade in frozen eggs to European countries, are factors for heavier call for ice. Ice making plants are located in Tsingtao and Dairen.

Brewery and distillery. Y.2,000,000. The heaviest investment in this group is the Dai Nippon Beer Brewery plant in Tsingtao. A number of "sake" and other brewery and distillery plants are in operation in Manchuria.

Oil and fat manufacturing. Y.4,000,000. Turns out glycerine, stearin, olein, hardened oil and others using as raw material soya bean oil for which Manchuria has a boundless capacity for supply. In recent years hardened oil is the mainstay of this industry.

Paint and paint material manufacturing. Y.2,000,000. The outstanding items of manufacture are paint and black sulphur dye. The production of the latter stuff was started in 1918 by a process perfected by a Japanese who is a pioneer in Manchuria's dyestuff industry. At that time no one was engaged in coloring material making by chemical process.

Machinery making. Y.20,000,000. Shipbuilding and repair, railway rolling stock and accessories, iron pipe, oil mill machinery and equipment. Their manufacture and repairing. The plants belonging to the South Manchuria Railway Company are not included in this estimate.

Fertilizers. Y.2,000,000. Mainly bone dust plants operated on an independent basis. Oil cake and oil meal producers, ramifications of soya oil enterprises in Manchuria, sulphate of ammonia plants in the iron and steel and gas industries are not covered by this estimate.

Others. Y.38,900,000. Wheat flour milling, soap making, cement and countless other medium and small manufacturing activities and investments.

5. Mining. Y.176,000,000. Iron, coal and petroleum mining, and their processing. The largest percentage of this investment is in Manchuria, but its fair share is also represented by the Hanyehping group of enterprises and in Shantung. Its history dates back to the Japanese-Russian War. Such activity has been in evidence since an early period in Manchuria, but in other sections it is only a few years old. Because of the fact that Government negotiations are often necessary before projects of this class are started and operated smoothly and, as tremendous amounts of capital have to be locked up on a permanent basis, the majority of these Japanese enterprises in China have passed through an eventful life.

Business investments classified by Provinces. Japan's business investments by Provinces are as follow (in Y.1,000) :

Chihli	43,501	Kiangsi	127
Kiangsu	274,180	Yunnan	75
Fukien	7,006	Anhwei	486
Hupei	40,543	Shantung	140,974
Kwantung	7,858	Heilungkiang	39,099
Szechwan	188	Kirin	102,589
Chekiang..	86	Fengtien	1,152,442
		Total	1,809,154

In those of the above territories where Japanese investment is particularly heavy are large cities which are closely connected with our country in many ways. For instance, Chihli has Tientsin and Peking ; Kiangsu has Shanghai ; Hupei has Hankow ; Kwantung as Canton ; Shantung has Tsingtow ; Kirin has Harbin and Changchun, and Fengtien has Dairen and Mukden. In the subjoined tabulation we give the amount of our investments in those of the leading cities, where we could gather the necessary data for such compliation :

OUR INVESTMENTS IN PRINCIPAL CHINESE CENTERS
(Exclusive of Loans)

	Investments Yen	Real estate holdings Yen	Settlement corporation disbursements* Yen	Total Yen
Shanghai.. ..	192,860,000	80,769,000	376,200	274,005,200
Peking	7,178,000†		—	7,178,000
Tientsin ..	15,068,225	19,342,950	1,551,825	35,963,000
Tsingtau	90,683,840	48,483,000	468,160	139,645,000
Hankow	15,706,960	24,208,400	125,400	40,040,760
Canton	7,337,000†		—	7,337,000
Dairen	703,093,000†		—	703,093,000
Mukden	50,120,400†			50,120,400
Total ..	1,082,047,425	172,813,350	2,521,585	1,257,382,360

*Annual outlay. †Including real property.

A comparison of the foregoing two tabulations will reveal the fact that the city investments are accountable for the largest percentage of those for the Provinces. To analyze and explain the investment conditions of cities, therefore, would be to a great extent tantamount to doing the same thing for the Provinces. To avoid repetition we shall briefly dwell upon the investment situation at the principal centers.

1. *Shanghai.*—The outstanding investment activity here is cotton spinning which, at Y.170,000,000, accounts for 60 per cent. of the entire capital tied up. (Note: refer to business investments classified by groups). In the order of importance carrier trade, banking and the East Asia Industrial Company investments follow the spinning industry. Then come many lesser corporate and individual enterprises. Relative importance of the real estate holdings of these interests closely follow this order, cotton spinning retaining an overwhelming lead. Settlement corporation disbursements are the annual expenses for running schools, hospitals, cemeteries and other social and cultural facilities.

2. *Peking.*—Leading investments in Peking are the Yokohama Specie Bank, the East Ascia Industrial Company, the Industrial Bank of Japan, the Mitsui Bussan Kaisha, the Mitsubishi Trading Company, the Furukawa Electro Industry Company, the Kuhara Mining Company, the Japan-China Dojin Hospital and others involving Y.6,000,000 capital outlay. This figure corresponds to 83 to 84 per cent. of the entire Peking investments and the remaining Y.1,000,000 represents the investments by indivduals and smaller business firms.

3. *Tientsin.*—Like in Shanghai, cotton spinning again dominates the Japanese business community, being responsible for 55 per cent. of the whole investment. Tobacco and safety match manufacturing, at 34 per cent, come second, followed by slaughter house, refrigeration, bone dust, leather tanning and other enterprises which are characteristic of the locality.

4. *Tsingtao.*—This city holds the second largest share of Japanese capital, surpassed only by Shanghai, cotton spinning and weaving and silk spinning mills being the most heavily capitalized, at Y.50,000,000. Enterprises with capital stock of from one to many millions of yen are numerous for safety match making, oil extracting, flour milling, meat dressing, warehousing and colliery activities.

5. *Hankow.*—As the second most important commercial port on the Yangtze, next to Shanghai, Hankow claims a large proportion of Japanese capital investments in China in foreign trade and water navigation concerns. The real estate holdings of these two activities assume the dimensions of Y.24,000,000, being 60 per cent. of the entire investment. Cotton spinning comes second at Y.6,000,000 or 15 per cent. and the remaining 25 per cent. is shared by banks, real estate and building companies, and retail establishments.

6. *Canton.*—The bulk of capital outlay in this community is for import and export trading and other commercial operations.

7.—*Dairen.*—The major part of Dairen investments are for the South Manchuria Railway Company and its subsidiaries, being accountable for Y.580,000,000. This figure about represents the approximate total of S.M.R. investments in Dairen where any separate assessments of its individual enterprises are difficult to make. Investments by other interests approximate Y.120,000,000 of which important shares go to the Dairen Steamship Company, Dairen Oil Manufacturing Company, South Manchuria Gas Company, Dairen Exchange and Trust Company, Manchuria Business Promotion Company and others.

8. *Mukden.*—Investments here run up to Y.50,000,000 of which Y.20,000,000 is contributed by tobacco, sugar refining, hemp spinning, ceramic, paper making, lumber working, tussah silk reeling, spinning and other industries. Finance and trusts are responsible for Y.12,000,000 investment, as is agriculture for Y.7,000,000, mining Y.2,000,000 and other Y.8,000,000, to cite further cases.

2 Japanese Loans to China

A complete lack of authentic data on Japan's investments in the form of loans to China makes any intelligent study of the subject next to impossible. An inquiry into the loan situation based on information, which seems to be fairly authoritative, discloses, however, that such financings outstanding at the end of 1928 assumed the proportions of Y.730,477,000 in the aggregate.

The above estimate, however, does not include claims amounting to about Y.109,918,000 of which 6 per cent. Treasury Notes of Tsingtao-Tsinanfu Railway, Treasury Notes for Compensation of Tsingtao Public Property and Salt Industry and Boxer Indemnity constitute a part. At the same time, it is within the bounds of possibility that quite a number of claim items have failed to come to our notice because of incomplete data at present available and these we may have an opportunity to correct at some future time. The following is a list of the more important of the loans which Japan has granted to China:

Denominations of loans and claims	Dat of loan	Amount (,000 omitted)
Japanese share of Chinese Government 5% Reorganization Loan for £25,000,000	1913	Y.49,880
Bank of Communications Loan	1917	29,794
Gold Mine and Forests Loan of Kirin Heilungkiang and Interest Loan	1918-22	58,234
Kirin-Heuning Railway Construction Advance	1918	12,625
Tsi-Shun Kao-Hsu Railway Construction Advance	1918	25,600
Four Railways in Manchuria and Mongolia Construction Advance and Interest Loans	1918-25	50,362
War Participation Loan and Interest Loan thereon	1918	38,895
Arms Loan and Interest Loan	1917	62,443
Telegraph Loan and Interest Loans	1918-25	38,724
Advance for Ssu-Tao Railway	1918	32,000
Chinese Government Ssu-Cheng Railway	1916	4,780
Chinese Government 5% Railway Loan of 1911	1911	12,738
Peking-Suiyang Railway Loan	1917-25	17,871
Telegraph Extension and Improvement Advance and Interest Loan	1910-16	13,398
Telephone Extension Loan and Interest Loans	1919-23	22,559
8% Bonds for Refunding Internal and Foreign Short Term Debts (Japanese portion)	1922	37,675
Engraving Loan, Ministry of Finance	1918	4,216
Shensi Copper Mine Loan	1910	5,410
Other Loans and Claims	—	213,273
Total		730,477

Of the above Y.730,477,000 loans, Y.64,000,000 are funded and the balance Y.666,477,000 are unfunded.

Chinese Government obligations account for Y.553,237,000 and corporate and individual debts Y.177,240,000.

While it is impossible to draw a clear line of demarcation between loans on which interest payment is being effected without a hitch and those on which such disbursements are in arrears, Y.54,660,000 indebtedness probably belongs to the former class and the remaining Y.675,817,000 to the latter description.

Classified by the purpose of the loans:

1.	General financial	Y.142,354,000
2.	Railway	164,219,000
3.	Communications	75,609,000
4.	Military	102,559,000
5.	Industrial	245,090,000
6.	Miscellaneous	646,000
	Total	Y.730,477,000

Another method of classifying Chinese loans, which is occasionally used, is by whether their security pledged is sound or not sound, but we have refrained from making such a classification here as we consider it largely a matter of opinion and serves no practical purpose after all.

Manchuria's Thousand Mile Railway Program

THAT the Chinese are determined to circumvent Japan's economic expansion in Manchuria by developing their own railway lines, building their own harbors, establishing their own industries and commercial enterprises, is indicated by the announcement from Mukden that five new railways with a total mileage of about 1,000 miles are to be built during the present year. The Chinese in Manchuria are not making boasts about driving the Japanese out by force of arms, or are they raising diplomatic issues as to the validity of the 1915 or any other treaty. There is no talk of fighting to the last man to save the province from Japan, nor is there any propaganda campaign to have Americans intervene by force to defend their territorial integrity or sovereign rights. The Chinese officials throughout Manchuria accept the permanence of Japan's position in South Manchuria, and realize that what she holds, she will keep. So they have deliberately planned to construct a network of Chinese railway lines connecting up all the principal cities in the Three Eastern Provinces in order to liberate them from dependence upon the Japanese controlled system.

Although some of the new railways infringe on the treaties with Japan stipulating that no new lines may be built paralleling the South Manchuria line, the Japanese have not protested vigorously against this breach of faith. The Japanese feel that all these new and projected Chinese railways will swell the traffic of their own lines and increase their profits. The Japanese, in effect, state that the more new railways, the better it will be for Manchuria, and the more chance they will have of benefitting from the development of the vast resources of the province. Japan's policy toward these new developments is identical with her attitude towards the rest of China ; every mile of new railway in any part of China that opens up new territory and markets, will benefit her trade, and she don't particularly care who builds or finances them.

The Manchurian officials with the vast resources of the three provinces to draw upon for taxes, have always sufficient funds to carry through their constructive plans. They are not handicapped by defaulted loan payments or by military interference in the operation of the lines within their jurisdiction. The competition between China and Japan to develop this territory in engendering a spirit of co-operation that although somewhat different to what Japan originally hoped to bring about, is rapidly tending to solve a problem that for many years, has embittered relations between the two countries. In this, the Manchurian Chinese are showing common sense, a better appreciation of what they are up against than is apparent in Nanking. With prosperity, peace, stability, protection and an assurance of justice in Manchuria for ten years, the Manchurian problem will automatically solve itself.

Much of the friction between the Japanese and Chinese in Manchuria, arose out of Chang Tso-lin's ambitious plans to conquer the rest of China, draining the province of its wealth to defray the cost of these wars. Had Chang Tso-lin kept within his own bailiwick and employed the money wrung from the farmers on public improvements and development works, Manchuria would have witnessed a boom that would have astonished the world. Now that his son is minding his own affairs and devoting his energies to constructive measures, Manchuria will once more forge ahead of the rest of China as the most profitable and active market for engineering materials.

The new lines to be constructed this year by the Manchurian authorities are :

1. *Kiutai-Changkiawan Railway* :—This line will start at the Kiutai Station of the Kirin-Changchun Railway and terminate at the Changkiawan Station on the Chinese Eastern Railway with a total mileage of over 27 miles. The proposal to construct this railway was submitted by the Kirin Provincial Government. It will facilitate transportation between the Provincial capital of Kirin and Harbin. Work will be started shortly and all construction expenses will be borne by the Kirin Provincial Government.

2. *Hsinkingfu-Fushun Railway* :—The plan to construct this line was submitted by the Hsinking Chamber of Commerce which was subsequently approved by the Northeastern Communications Committee. The line will be a semi-official enterprise and part of the construction expense will be furnished by the Shenyang-Hailun Railway Administration and part to be subscribed by the commercial interests of the two terminal cities. The length of the line will be 40 miles (120 li) and construction is expected to begin in the middle of May following completion of surveying.

3. *Tsitsihar-Heiho Railway* :—The lack of communication facilities along the Heilungkiang border was keenly felt during the recent Sino-Soviet dispute when Heiho was threatened by Soviet troops. The Northeastern Communications Committee, therefore, will petition the Central Government to reserve part of the returned Boxer Indemnity for the construction of this 600 mile line. A special representative of the North-Eastern authorities will soon leave for Nanking to confer with the Ministry of Railways relative to the proposed construction.

4. *Kaiping-Fuchow Railway* :—The construction of this line was first proposed in 1927 but the project was dropped on account of Japanese participation which was regarded as an infringement of China's sovereign rights. The present scheme is to make the line a semi-official enterprise as the salt merchants in the district will subscribe for all the private shares. A petition for construction of this line will be submitted to the Communications Committee for consideration immediately after completion of the survey.

5. *Hulan-Holihkang Railway* :—This line will start from Hulan and terminate at Holihkang in Heilungkiang. The plan is initiated by the Provincial Department of Reconstruction of Heilungkiang to facilitate the transportation of coal from the Holihkang mines. Construction expenses will be borne by the merchants of Hulan and Payenchow and also the Holihang mining interests.

Economics of Flood Control in China

By MAJOR O. J. TODD

[This article is one of a series prepared under the direction of Dr. J. A. L. Waddell, Advisor to the Ministry of Railways of China. Other articles in this series have been published in previous issues of the "Far Eastern Review."]

CHINA'S flood problems have always been formidable, and her people have felt their incapacity to deal adequately with them in extreme conditions. This old country has learned many things from her floods through the centuries of her recorded history ; and among these is this—it is a work requiring broad co-operation and huge expenditures of human effort and materials.

Between floods China rests complacently, and does only moderate up-keep on dykes, river walls, groins, etc. Then extreme high water of summer causes anxiety where dykes are known to be weak. The factor of safety on river protection is low, as a rule ; and dyke-breaks are not infrequent occurrences. For example, the one just now occuring on the south bank of the Yellow River, near the border of Shantung and Hopei (Chihli) Provinces might have been prevented by the expenditure of the $20,000 which was appropriated more than a year before the break occurred for the purpose of strengthening the point of rupture. This fund was used for other purposes ; high water came in mid-August of this year ; the dyke failed ; and four counties suffered heavily from flood losses. The cost of repairs may run to $500,000. Thus China suffers from floods on the Yellow River.

The Yangtze River has gone out of its banks in high water periods so frequently that in many districts no determined efforts have been made to safeguard the river-bottom lands. The Han River, too, in Hupeh, has caused millions of dollars of losses by dyke-breaks that have drowned out valuable crops of beans, rice, cotton, kaoliang, etc. Heavy flood losses occurred in Kiangsi Province along the Han River in 1924 and again two years later. A little less damaging floods occur occasionally in Hunan Province along the Siang River. Again, in the Canton delta, the West River has caused damages that have run into many millions, because that river has not yet been properly controlled.

In cataloging the chief rivers of China that go on rampages and cause many millions of dollars in losses, besides the toll in human lives, there must be included the Hwai River, coming through Anhwei and Kiangsu into the Yellow Sea. The flood of 1922 on that river has been estimated as causing $300,000,000 damages to crops and to village and town property.

The river system of Hopei (Chihli) emptying into the sea near Tientsin, offers problems to the conservancy engineer. Here a flood of unusual extent so damaged property in Tientsin in 1917 that a special Commission was formed the next year to study this particular problem. While these studies were still going on, the floods of July and August, 1924, occurred, causing $200,000,000 in damages to farm crops alone and the submerging of 10,000 square miles of farm lands. Minor floods and dike-breaks on the Yung

Ting Ho, such as that of the past summer, cause little excitement, though this river breaks its dykes and pours its muddy water over farm lands to the south, almost entirely abandoning its original channel for the time. The volume of the peak flood at the date of the break this summer was probably 150,000 cubic feet per second. The mud load was probably from 12 per cent to 15 per cent by volume. Samples that we took ran as high as 22 per cent in solids.

Now when we consider the extent of these floods only to mention some of the largest of the rivers, we come face to face with some of China's great river problems that the engineer must solve. These are real engineering problems, requiring long and careful field studies for proper solution. No two of the great rivers of China act alike, due to many different contributing factors, not the least important of which is the mud-load carried in solution. In North China, where much of the drainage is from loess-covered hills, the matter of silting is of such moment that the question of suitable velocities to prevent undue sedimentation in main channels is still an open one.

In the studies made for the Grand Canal rehabilitation in Shantung in 1919, special attention was given to the behavior of the Yellow River. It was found to carry as high as 10 per cent by volume in solids in solution while flowing at 7 ft. to 8 ft. per second. With a dropping river or retarded velocities due to a dyke-break where the flow spreads out over a wide territory, sedimentation took place very rapidly, particularly after the velocities fell below 5 ft. per second. Places along the south dyke of the Yellow River were found where, in recent dyke-breaks, deposits of silt five feet deep occurred, having been formed in a few days. The writer observed the heavy silting following the break of late August, 1925, along the south dyke of the Yellow River in western Shantung at Linpuchi. Here, within a period of less than a month, mud deposits from four to six feet deep were left where flood waters had been temporarily ponded.

The difficulty caused to shipping at Tientsin during the past year was due to heavy silt deposits being brought into the Hai Ho from the Yung Ting Ho at the time of the summer rains of 1928. Dyke-breaks to the west of Tientsin had let escape across country the water that should have remained ponded to flow down in a fairly clear condition and wash through to the sea the mud in transit in the Hai Ho. Velocities dropped so rapidly in that river that deposit took place at an unusual rate, and the stream became choked with mud. Steamboats were, consequently, unable to use this river for navigation for a year.

This Tientsin situation alone has enlisted the attention of a number of competent engineers, most of whom are pretty well agreed on the best means to insure this port and the farm lands to the west from flood damage. The majority of these engineers favor an adequate flood channel, preferably one taking off from the Hai Ho near the Grand Canal, 25 miles southwest of Tientsin, and running east 45 miles to the sea. This, with the special structures needed to make it complete, will cost approximately $10,000,000.

Much as this will aid in relieving the situation at Tientsin, by helping to get rid of excess flood-waters during the period of heavy run-off. In conjunction with it and just to the west, there must be a generous area of condemned low land to act as a sedimentation basin for water that will later go *via* Tientsin to keep the Hai Ho flushed free of new mud, and thus avoid a repetition of last year's difficulty.

The whole problem of flood control in the Tientsin area and to the west is complicated—chiefly due to the silt element. It will be solved satisfactorily only when a carefully chosen commission composed of highly qualified engineers familiar with North China conditions, is given full power over the entire problem and is supported by a bond issue or other appropriation commensurate with the size of the project. The carrying through of a broad flood-prevention program in this area will take no less than five years after funds are in hand. The preliminary field studies have been carried out during the past ten years.

The Yellow River continues to be the most vexatious of all China's waterways, because of its size and its silt load. Though the Yangtze has a maximum flow six times as great, its silt load is of a different nature, and the percentage of solids carried in suspension is much less. Its banks are more stable, and it shoals less rapidly. The Yellow River builds up quickly as floods recede, and cuts out a new channel for itself with almost the same rapidity in flood time, so that it maintains a regimen that would be satisfactory if bank-protective work were properly kept up.

Much has been done in the past few decades to keep the Yellow River within due bounds in the bed it chose in 1851, when it broke its northern dykes in eastern Honan and deserted the course to the southeast that it had followed for the preceding five centuries. Its new course to the northeast, through northern Shantung, has remained nearly the same since that time. Protective work to keep the banks from being eaten away has been carried on pretty consistently, except during the last few years, when funds have been very limited. Stone walls, stone groins on pile foundations, kaoliang groins, and fishscale walls have been used to good advantage along this section of the Yellow River. Willow mattresses weighted down by stones have not been used to any extent.

The difficulty of navigating the Yellow River, except by shallow-draft junks, has made rock transportation against the current very costly. Therefore, above the crossing of the Grand Canal in Shantung, most of the protective work in that province is of the kaoliang pak-work type. These corn-like stalks are used with their roots, and are placed normal to the shore line with their tops towards the land. A six-inch layer of the stalks is covered by a six-inch layer of earth until the groin is thus built by alternate layers above the height of floods. The structure is tied back by means of willow cross-stakes and hemp ropes fastened to stakes driven well back on the dyke. As these kaoliang groins settle into the water, fresh layers are placed on top. They are the best substitute for stone that has been found in this region. They are used also on the Yung Ting Ho and other northern rivers, but not along the Yangtze.

Tree retards have been adopted advantageously in time of flood along the Yuang Ting Ho. They are of value in retarding velocities close to shore, where undercutting of loess banks becomes dangerous. Silting is often thus produced where desired, and the danger from cutting is arrested. Willow trees are grown along the Yung Ting Ho for this purpose. They have seldom been so used along the Yangtze.

The matter of constricting the channels of these rivers so as to cause these northern rivers to dig fairly deep beds in flood times has not been consistently carried out. However, on the Yellow River where such control exist, due to the ease of procuring adequate rock supplies at low cost, there is little trouble with shoaling or channel changes. It has been recommended that at the crossing of the Peping-Hankow Railway, where this river sprawls out nearly two miles wide, it would be practical and economical in bridging to restrict the width of the channel, build new dykes protected by stone work, and hold the river within reasonable bounds, where it can cut a deeper channel in the loess soil through which it flows.

To the layman, this question of holding rivers within properly defined banks may seem simple enough. In the first place, it requires concentrated authority; and then it needs large sums of money or quantities of labor and materials. China has worked at the job in places, but has effected a mere beginning. One of the main criticisms to be made of much of the river-control work of China is that, as a rule, the factor of safety is altogether too low. This is partly because hydraulic data have not been carefully compiled over a sufficiently long period of years, and because there have been too few men in places of authority who would know how to use intelligently such data, if the information were in their hands. Then there is the difficulty of adequate funds. Officials have not generally recognized the need for the degree of insurance against flood that western engineering would dictate.

By way of illustrating this last point, I shall mention the incident of the Shihshow Dyke along the Yangtze 300 miles above Hankow. Here the river cut away unprotected dykes and flooded 30,000 acres of fine bottom lands, so that this area had become useless, except in low water periods. After five years of effort, funds were raised; and the local officials managed to obtain financial support from the provincial Famine Relief Committee. A dyke was thrown up without proper engineering direction, only to be washed out by the summer floods. It was undermined as well as overtopped. Two years later the writer was asked to tackle the problem; and, in the spring of 1925, he put in a dyke that has withstood the action of current and wave and hydrostatic pressure, such as caused some of the "boils" that undermined the previous work. After careful investigation of the site in the spring, it was found that the Yangtze had for years been depositing alternate layers of clay and sand across the stretch to be dyked. Test pits and borings showed that bad sand-fills ran as deep as 12 to 14 feet in places.

(Continued on pags 32).

The Big Five in Japanese Banking

BY HERBERT M. BRATTER

The Ordinary Banks

The following article is taken from an interesting pamphlet prepared by Mr. Bratter and published by the U. S. Department of Commerce. Mr. Bratter had seen years of experience in the Far East and is therefore familiar with the tremendous forces which these groups of banks control. The development of modern industry in Japan makes an enlightening tale, but the growth of modern banking is fascinating, because to a very much greater degree than elsewhere do the Japanese banks control and support commerce and industry in their country. It was impossible, because of its length, to publish Mr. Bratter's article in full.

This article makes no reference to the great Government banks of Japan, such as the Bank of Japan, The Yokohama Specie Bank, etc.

THE "Big Five" are all ordinary banks. By the ordinary banks in Japan are meant the commercial and exchange banks as distinguished from the special, or Government-controlled institutions. The number of ordinary banks has been steadily declining in recent years, owing to a progressive, Government-encouraged amalgamation which has tended to eliminate many of the smaller and weaker banks. At the end of December, 1928, there were 1,031 ordinary banks, 100 savings banks, and 32 special banks. (This total includes the Bank of Japan). In addition there were 37 trust companies and 258 mujin, (mutual banking organizations). The ordinary banks had a total capital of 2,183.1 million yen, compared with 488.4 million yen for the special banks, (including the Bank of Japan), and 89.1 million for the savings banks. The capital of the trust companies was 333.5 million yen.

In the 18 months following June 30, 1927, the number of ordinary banks declined from 1,359 to 1,031. Their total capital showed a less marked decrease, declining from 2,378.2 million yen to 2,183.1 million.

The most noteworthy feature revealed . . . is that five ordinary banks at the end of 1928 held over 26 per cent. of all money deposited with all ordinary, special, and savings banks in Japan. If to the deposits in these five banks are added the deposits of the nine next largest, (from the standpoint of deposits), banks, more than 43 per cent. of all such deposits are lodged with 14 private institutions. These 14 banks together held Y.5,062,000,000, or 54.93 per cent. of the deposits of all ordinary banks in Japan proper, while the "Big Five" with Y.3,130,000,000, held 33.96 per cent. of the total deposits of ordinary banks at the end of 1928. The deposits of the "Big Five" were more than two and one-half times the total savings bank deposits, which were only Y.1,241,000,000. If to the latter amount be added Y.1,743,000,000, representing postal-savings deposits at the end of 1928, the resultant Y.2,984,000,000 still is less than the deposits of the "Big Five." Compared with their deposits, the Y.1,300,000,000 on deposit with all the special banks at the end of 1928 represented considerably less than half of the "Big Five's" Y.3,130,000,000.

Viscount Shibusawa, the Genro of Banking in Japan

In the case of loans the "Big Five," while still of considerable influence, showed only 14.30 per cent. of total bank loans at the end of 1928. Whereas the deposits of the "Big Five" represented 33.96 per cent. of total ordinary bank deposits, the advances of the "Big Five" were only 21.68 per cent. of total ordinary bank advances. This difference is due to the unusual conditions which followed the crisis of 1927, resulting in a policy of caution among the stronger banks and important transfers of deposits to the "Big Five," while smaller ordinary banks, both urban and rural, found themselves with proportionately less deposits and with less liquid advances outstanding.

COMPARISON OF LOANS OF SPECIAL, SAVINGS, AND ORDINARY BANKS OUTSTANDING AT THE END OF 1928

Group	Amount, in millions of yen	Per cent of total
The "Big-Five" ...	1,602	14.30
Other ordinary banks	5,787	51.67
Total, ordinary banks	7,389	65.97
Savings banks	336	2.99
Special banks ...	3,478	31.04
Grand Total ...	11,203	100.00

The Big Five Aligned

Among the "Big Five" the Yasuda Bank, (Ltd.), ranks first as to capital, total profits earned, deposits, advances, and total resources. The several tables following reveal the relative position of the five banks in these and other respects.

Capital, Reserves, and Assets

The authorized and paid-up capital of the "Big Five," as well as the reserves, assets, and liabilities, are shown below for December 31, 1928.

CAPITAL, RESERVES, AND TOTAL ASSETS OF THE "BIG FIVE," DECEMBER 31, 1928

[In millions of yen]

Bank	Capital		Reserve fund, (including special reserve fund)	Pension reserve fund	Total assets and liabilities
	Authorized	Paid-up			
Mitsui ...	100.00	60.0	63.5	2.4	872.9
Mitsubishi ...	50.0	30.0	34.3	—	697.2
Dai-ichi ...	57.5	57.5	62.8	—	750.9
Sumitomo ...	70.0	50.0	25.0	2.0	825.9
Yasuda ...	150.0	92.8	60.6	—	995.4
Total ...	427.5	290.3	246.2	...	4,142.3

Profits During 1927 and 1928

The net profits of the "Big Five," excluding previous balances brought forward, were as follows during the last three terms :

Net Profits of the "Big Five," 1927 and 1928

[In thousands of yen]

Bank	1927, second half year	1928 First half year	1928 Second half year
Mitsui	6,680	6,743	4,693
Mitsubishi	4,192	4,189	4,200
Dai-ichi	5,121	5,105	4,745
Sumitomo	3,686	3,268	3,133
Yasuda	6,317	6,600	6,023

With the exception of the Mitsubishi Bank, all these banks showed a decrease in profits during the last half of 1928. This condition is partly accounted for by unstable conditions in the money market due to fluctuating exchange and intermittent rumors of the removal of the gold embargo. Money was plentiful, interest rates declined, and good investments for bank funds were comparatively scarce. The amalgamation or elimination of many small banks has been an added factor in swelling the funds on deposit with the larger banks in Japan.

The total deposits of the "Big Five" at the end of 1928 were Y.3,129,969,000, this being larger than the 1927 figure by Y.302,086,000; and exceeding by Y.906,818,000 the 1926, (year prior to the panic), figure. While thus expanding in amount, the deposits of these five banks at the same time increased relatively as compared with total bank deposits in Japan. This relative increase appears in the following figures :

Bank Deposits, 1926, 1927, and 1928

[In millions of yen]

End of—	The "Big Five"	All ordinary banks, including the "Big Five"	All banks, ordinary, savings, and special
1926	2,223	9,031	11,416
1927	2,828	8,906	11,465
1928	3,130	9,216	11,757

The increase in deposits during the second half of 1928 came principally to the Sumitomo and Mitsubishi Banks. Decreases appeared in the case of the Yasuda and Mitsui Banks.

Advances by these five banks increased during the second term of 1928 except in the case of the Yasuda Bank. The latter exception is traceable to the decline in deposits. The figures for advances and deposits of all five banks during the second half of 1928 show an increase of roughly 2.5 per cent. in deposits and 3.2 per cent. in advances. Advances at the end of 1928 totaled just over 51 per cent. of deposits. The following figures compare advances and deposits during 1928.

Deposits and Advances of the "Big Five" in 1928

[In thousands of yen]

Bank	Deposits End of first half year	Deposits End of second half year	Advances End of first half year	Advances End of second half year
Mitsui	618,578	605,609	331,514	343,831
Mitsubishi	525,151	562,252	192,502	209,928
Dai-ichi	566,520	597,301	248,771	274,540
Sumitomo	595,442	642,862	287,543	291,113
Yasuda	745,222	721,945	492,222	483,002
Total	3,050,913	3,129,969	1,552,552	1,602,414

The recently proposed absorption of the Morimura Bank, (capital Y.2,080,000 paid up), by the Mitsubishi Bank, will increase the "Big Five" of the importance during 1929.

Security Holdings

One result of the concentration of funds in the larger banks has been a noticeable increase in security holdings of the "Big Five." The amounts of such investments held at the end of 1928 as compared with the position on June 30, 1928, are shown in the following table.

Securities Held by the "Big Five"

[In thousands of yen]

Bank	Dec. 31, 1928	Increase over holdings on June 30, 1928
Mitsui	234,598	82,769
Mitsubishi	322,893	89,130
Dai-ichi	248,597	30,142
Sumitomo	235,691	89,130
Yasuda	278,308	61,976
Total, "Big Five"	1,320,087	317,745
Total, all associated banks in Japan	3,076,950	709,102

Employment of Resources

The foregoing tables show the relative position of the members of the "Big Five" in respect of individual items such as capital, reserves and deposits. Below, by way of résumé, are presented tables measuring the business of these five institutions at the end of 1928, from the standpoint of profitable employment of resources.

The first of these tables gives, in a form slightly different from those above, the relation of paid-up capital and reserves to deposits, advances, and total assets and liabilities. There has also been included a table of profits which appeared in Commerce, (Calcutta). The next table, in briefer form, shows the results of these comparisons. The first feature there revealed is that the Mitsubishi Bank, ranking last in capital, deposits, advances, and total assets, and only fourth in the amount of profit earned in 1928, was first in percentage of profits earned on paid-up capital, and on paid-up capital plus reserves. Moreover, the figures published in Commerce, (as here reproduced), show the Mitsubishi Bank to be a very close second in profit earned "on all funds."

The Yasuda Bank on the other hand, although leading in all other items, is fourth in profit earned on capital and in profit earned on capital plus reserves. When deposits are included in the comparison, the Yasuda Bank again takes first place, (although leading the Mitsubishi by only 0.04 of 1 per cent.).

The Mitsubishi Bank is fairly constant in second and third place. While the Dai-ichi Bank falls behind in profit on capital and reserves, it makes a better showing in profit "on all funds."

The "Big Five": Relation of Paid-up Capital and Reserves to Deposits, Advances, and Total Assets on December 31, 1928

[In million yen]

Bank	Paid-up capital	Reserves, (including special reserve fund	Paid-up capital and reserves	Total deposits	Total advances	Total assets and liabilities	Profits, 1928 First term	Profits, 1928 Second term	Profits, 1928 Total	Profits expressed in per cent of total paid-up capital and reserves
Mitsui ...	60.0	63.5	123.5	605.6	343.8	872.9	6.7	4.7	11.4	9.2
Mitsubishi	30.0	34.3	64.3	562.3	209.9	697.2	4.2	4.2	8.4	13.1
Dai-ichi	57.5	62.8	120.3	597.3	274.5	750.9	5.1	4.7	9.8	8.1
Sumitomo	50.0	25.0	75.0	642.9	291.1	825.9	3.3	3.1	6.4	8.5
Yasuda	92.8	60.6	153.4	721.9	483.0	995.4	6.6	6.0	12.6	8.2
Total	290.3	246.2	536.5	3,130.0	1,602.3	4,142.3	25.9	22.7	48.6	...

The following comment and table, dealing with the "Big Five," is from Commerce, (Calcutta), of June 1, 1929, (p. 1150) :

> Profits have declined relatively as well as absolutely. To show this movement, they are figured first in relation to paid capitalization ; secondly, in relation to the sum of deposits, capitalization, and reserves, minus bank premises. This total should be a fair approximation of the amount which a bank has, (or should have), available for investment and cash reserves :

Profit Ratios of "Big Five" Banks, 1928

Bank	On paid capital First term	On paid capital Second term	On all funds First term	On all funds Second term
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Mitsui	22.5	15.6	1.82	1.29
Mitsubishi ...	27.6	28.0	1.41	1.34
First, (Dai-ichi) ...	17.6	16.4	1.49	1.19
Sumitomo ...	13.1	12.5	.98	.87
Yasuda	14.2	13.0	1.48	1.38

Relative Rank of the " Big Five " at the End of 1928

[As shown in the tables above]

Bank	Paid-up capital and reserves	Deposits	Advances	Total assets and liabilities
Mitsui	2	3	2	2
Mitsubishi	5	5	5	5
Dai-ichi	3	4	4	4
Sumitomo	4	2	3	3
Yasuda	1	1	1	1

		Profit for 1928		
Bank	In amount	In per cent. of paid-up capital	In per cent. of paid-up capital and reserves	In per cent. of " deposits, capitalization and reserves, minus bank premises "
Mitsui ...	2	3	2	3
Mitsubishi ...	4	1	1	2
Dai-ichi ...	3	2	5	4
Sumitomo ...	5	5	3	5
Yasuda ...	1	4	4	1

The shares of four of the " Big Five " are listed on the Tokyo Stock Exchange. Upon the completion of the new capitalization of the Mitsubishi Bank in 1929, its shares will for the first time be listed.

Of the " Big Five," all but the Dai-ichi Bank have established trust companies. These, however, will not be discussed here.

Mitsui Bank, (Ltd.)

Origin

Since May, 1683, when the Mitsui Bank of to-day had its origin in the " exchange house " opened in Yedo by Takatoshi Mitsui, the enterprise continued to grow under two names—Mitsui Exchange House, (Mitsui Ryogayedana), and Mitsui House, (Mitsui-gumi). In addition to its commercial interests and to the money changing, the bank acted as financial agent for the Tokugawas and, later, for the imperial Government. In 1876 the bank became the Private Bank Mitsui Ginko and in 1893, in the form of a partnership, the Gomei Kaisha Mitsui Ginko. It assumed its present form in October, 1909, when it was incorporated as a full-fledged joint-stock company—the Mitsui Bank, (Ltd.).

Relationship With Government

The close relationship that had existed between the Mitsui-gumi and the Government under the shoguns continued when the Restoration brought the Emperor back into power. This is told in the story of the Mitsui Bank, which goes on to say :

> The Government had to resort to the levy of a forced loan of 3,000,000 ryo from the Mitsui-gumi and other wealthy merchants in Kyoto and Yedo, in January, 1868, the proceeds to form a Treasury fund. Then came another of 50,000 ryo, in February, to defray the expense of an Imperial expedition to Osaka and still another of 150,000 ryo, in April, to be used in pacifying the Kwanto district.
>
> Of the 3,000,000 ryo loan, which may be regarded as the very first national debt raised as such in the country, it may be said that it had to be floated under very adverse conditions, with disorders and unrest almost all over the land.

In February, 1868, the Mitsui-gumi, in conjunction with the Ono-gumi and Shimada-Gumi, were intrusted with the exchequer business of the Government. Soon thereafter plans were formulated for the organization of modern banks modeled on the occidental system ; and the Mitsui family petitioned for the privilege of issuing convertible notes, submitting with the petition their plan for a bank. The Government, however, intrusted the Mitsui-gumi with the issue of " treasury convertible notes " and " colonization convertible notes."

The Mitsuis meanwhile continued studying modern banking methods, and in 1872 sent five young men of the family to the United States for purposes of study—a daring venture for the times. Although their petition for the right to found a bank had been turned down, the Mitsui-gumi felt confident that their wish would eventually be granted and continued with their plans for a large new building. This was completed in June, 1872. Here let us quote again from The Mitsui Bank :

> The public gave the new building the name of the " Mitsui-gumi House." It added a new feature to the capital and was used as the headquarters of the Mitsui-gumi.
>
> About the same time the Government promulgated the National Bank Act and proposed the plan of establishing national banks, with the First National Bank in Tokyo to be conducted as a joint enterprise of the Mitsui-gumi and Ono-gumi. Despite the Mitsui-gumi's desire to have a bank of their own, they were eventually persuaded to agree to the Government's scheme and in June, 1872, an application for permission to establish a national bank, signed by three members each of the Mitsui-gumi and Ono-gumi, was sent to the Government.
>
> The application was readily accepted, and the First National Bank, the predecessor of the present Dai-ichi Ginko, was established on June 11, 1873, with a capital of Y.2,440,800, of which Y.1,000,000 each was subscribed by the Mitsui-gumi and Ono-gumi. The bank opened for business on July 20, following, and the Mitsui-gumi House was occupied by the new bank.

First Private Bank in Japan

Thereafter the Mitsuis continued working for the founding of a bank entirely their own. On May 6, 1874, the Kawase Bank Mitsui-gumi was established. As the National Bank Act of 1872 prohibited the use of the name " ginko," (meaning " bank "), by any but national banks, this new company used the English word in its name. At that time there was no law regulating private banks, as distinguished from national banks. On July 7, 1875, the Mitsuis petitioned for formal permission to establish a " non-national " bank. In 1876 the application was approved for the formation of the Mitsui Bank, the first private bank in Japan. The liability of the shareholders was unlimited. This new bank on July 1, 1876, took over the financial business of the old Mitsui interests.

The Mitsui Bank's capital, fixed at Y.2,000,000, was taken up half " by the headquarters of the Mitsuis," one-quarter by individual members of the family, and the remainder by employees, former servants of the house. The Mitsui Bank took over the business of the Mitsui-gumi, consisting of deposits, Y.11,369,055 ; loans, Y.9,911,347 ; and cash, Y.1,580,544. It immediately opened over 30 branches and sub-branches all over the country. The principal business of the new bank was handling Government funds, which it continued to do until 1883, when the Bank of Japan took over that function and all the fiscal business of the Treasury. This took away the principal business of the Mitsui Bank and was a severe blow, necessitating radical reforms. Until 1903 the bank handled some Government funds in its branches at Yokohama and Yokosuka.

Reorganization and Expansion

A further drastic change was made in 1893, when the bank was reorganized into a partnership for commercial banking by buying up all the shares held by non-Mitsui shareholders and limiting the partnership to five members of the family. The new company, with a capital to Y.2,000,000, took the name of Gomei Kaisha Mitsui Ginko, (Partnership Mitsui Bank).

In 1898 the bank's capital was increased to Y.5,000,000, and in 1899 it added to its regular business a warehousing department, subsequently, (1909), formed into a separate company, (Toshin Warehouse Co.). On November 1, 1909, the partnership was abandoned for a joint-stock organization, with a paid-up capital of Y.20,000,000 ; the new company was called the Mitsui Bank, (Ltd.), and the old Mitsui Bank dissolved on December 20.

The systems of auditing and inspecting in force in the Mitsui Bank in 1909 were of ancient origin. According to the history of the Mitsui Bank :

> The old ledgers used nearly two centuries ago show by the dates of checking, that a system of examining books and supervising the business of the establishment obtained as far back as the days of the bank's prototype, the Mitsui Exchange House. In December, 1909, the bank adopted a new set of rules of inspection and auditing in order to keep a closer

supervision of its business. The head office sent out examiners without notice to all the branches, which were required to do their own auditing and inspecting at least, (once), every six months, thus keeping in force the double system.

From the beginning of the present century a closer relationship began between the money markets of Japan and those of the occidental countries. In keeping with that tendency, the Mitsui Bank in 1906 appointed Barclay & Co. its first correspondent and, in 1911, it revised its articles of association to include (1) issuing and underwriting public loans, and company bonds and stocks; (2) acceptance and guaranty; (3) trusteeship for collateral bonds.

With the World War came added expansion and prosperity. The first foreign office was opened at Shanghai in 1917, followed by New York, (1922), London, (1923), Bombay, (1923), and Surabaya, (1925). In July, 1919, the capital was increased from Y.20,000,000 to Y.100,000,000 and the number of shares increased to 1,200,000. Of the 800,000 new shares, 500,000 were taken by the Mitsui Gomei Kaisha, (Mitsui Holding Co.), composed of members of the Mitsui family, and the remaining 300,000 were offered to the public at a premium of Y.45 per share. Thus the Mitsui Bank ceased to be a purely private company. A separate foreign-exchange department was opened in 1924.

The 1923 earthquake destroyed the buildings of the head office—the Mitsui Gomei Kaisha—and those of the Yokohama branch. Resuming business on September 11, the bank emerged without a serious setback.

Of the present Y.100,000,000 capital of the bank, 60,000,000 is paid-up. Reserves and undivided profits totaled 67,007,821 at the end of 1928. On the same date deposits were Y.605,609,499, and total assets and liabilities Y.872,895,912. Profits for the second half of 1928 were, (including Y.2,697,635 previous balance and a Y.162,731 transfer from the pension fund), Y.7,390,221. These profits, which represented a decrease from the previous term, were distributed as follows:

	Yen
Reserve fund	500,000
Bonus	375.400
Pension fund	507,000
Dividend to shareholders	3,000,000
Balance carried forward	3,007,821
Total	7,390,221

From 1920 until 1927 the bank paid a 12 per cent. dividend, thus absorbing, as a rule, less than one-half the profits. This was supplemented in 1926 by a special 5 per cent. bonus in commemoration of the bank's jubilee. After the panic of 1927, in common with the principal banks of the country, the dividend rate was reduced, being fixed at 10 per cent. per annum. At the same time allocations to reserves were greatly increased. Dividends earned in 1927 totaled 13.5 million yen compared with 14.1 in 1926, 11.2 in 1925, and 16.7 in 1924.

While the dividend rate at the end of 1928 remained unchanged at 10 per cent., reductions of Y.1,000,000 were made in amounts credited to legal reserve, employees, pension fund, and bonus to officials. The net decline in profits from the previous half-year was approximately Y.2,000,000, this condition resulting from the great amount of cash on deposit. On this cash 5 per cent. interest was paid, but little safe employment could be found for the money. The rate for fixed deposits has now been reduced to 4½ per cent.

Mitsubishi Bank, (Ltd.)

The Mitsubishi Bank grew out of the establishment, in 1895, of the banking department of the Mitsubishi Goshi Kaisha, (a holding company with a present capitalization of Y.120,000,000). Although the history of the Mitsubishi enterprises does not go back as far as that of the Mitsui, it traces its origin to the times of the Shogunate, when Lord Yode Yamanouchi established a "clan company" in Osaka for the transportation of merchandise. The foundation of the present Mitsubishi interests was laid by Yataro Iwasaki, who took over the business in 1870. Known first as Tosa Kaisei Shosa, and later as Tsukumo Shokai, the company devoted itself to the shipping business of the Tosa clan. During Iwasaki's lifetime the business expanded into manufacturing and mining, and in 1875, on receipt of a imperial charter, changed its name to the Mitsubishi Mail Steamship Co. Thereafter the company grew with the development of the country. In 1880 it entered the exchange business. In 1884 the Government, divesting itself of its business enterprises, first loaned and later transferred to the Mitsubishi interests the Nagasaki Shipbuilding Yard. In 1885, upon obtaining control of the One Hundred and Nineteenth National Bank, the company added the business of general banking to its activities.

In 1885 another event of importance occurred in the amalgamation of the Kyodo Unyo Kaisha. (Union Transport Co.), with the Mitsubishi interests to form the Nippon Yusen Kaisha, (Japan Mail Steamship Co., (Ltd.)). With the transfer to this company of all the Mitsubishi shipping business, the company carried on its mining, shipbuilding, and banking activities under the name of the Mitsubishi Sha, (Mitsubishi Co.). In December, 1893, pursuant to the new commercial code, the Mitsubishi Goshi Kaisha came into being and took over all the business of the Mitsubishi Sha. Two years later, as mentioned above, a banking department was organized.

Important Units of the Concern

In 1917 the holding company was reorganized, and important units of the concern were one by one detached and established as separate concerns under the management of the mother company. Among these are, with the dates of their establishment, the following:

Company	Year established	Capital, in millions of yen
Mitsubishi Shipbuilding and Engineering Co., (Ltd.)	1917	50
Mitsubishi Iron and Steel Co., (Ltd.)	1917	25
Mitsubishi Warehouse Co., (Ltd.)	1918	10
Mitsubishi Trading Co., (Ltd.)	1918	15
Mitsubishi Mining Co., (Ltd.)	1918	100
Mitsubishi Marine and Fire Insurance Co., (Ltd.)...	1919	5
Mitsubishi Bank, (Ltd.)	1919	50
Mitsubishi Internal Combustion Engine Co., (Ltd.)	1920	5
Mitsubishi Electrical Engineering Co., (Ltd.) ...	1921	15

In 1928 the Mitsubishi interests acquired the Toyo Marine and Fire Insurance Co., a former Suzuki concern. The Toyo Sugar Manufacturing Co., another Suzuki enterprise, was taken over by the Meiji Sugar Co. and the Japan Sugar Co. The Meiji Sugar Co. is said to be closely associated with the Mitsubishis. The Mitsubishi Mining Co. has taken over four small mines since the panic of 1927. While controlled by the Iwasaki families, the shares of the holding company are not restricted to members of those families. The company, in addition to the enterprises mentioned above, is said to be interested in the Showa Bank, the Japan Victor Talking Machine Co., and other concerns.

Reorganization as Joint-Stock Company

The Mitsubishi Bank, (Ltd.), was reorganized as a joint-stock company in 1919, with a capital of Y.50,000,000. The bank's business has grown remarkably and it has realized profits of over 25 per cent. for the past several years, maintaining a dividend rate of about 10 per cent. Its reserves have grown to Y.36,500,000; and its deposits, which were 320,000,000 before the 1927 moratorium, were over Y.562,000,000 at the end of 1928. Total assets and liabilities on that date were Y.697,204,044; and its net profits for the last half of 1928 were 4,200,404, or, including the previous term's balance carried forward, Y.6,664,110. This total, which represented an increase of Y.350,405 for the term, was distributed as follows:

	Yen
Legal reserve fund	1,000,000
Special reserve fund	1,000,000
Pension reserve fund	250,000
Bonus	250,000
Dividend at 10 per cent. per annum	1,500,000
Balance carried forward	2,664,110
Total	6,664,110

At the end of 1928 the capital, (par value of capital stock, Y.100), of the bank was Y.50,000,000, (30,000,000 paid up); reserve funds totaled Y.36,500,000. To commemorate the tenth anniversary of the establishment of the bank as a joint-stock company, and with a view to maintaining a better balance between the capital and the rapidly increasing deposits the shareholders recently voted to increase the capital to Y.100,000,000. Although the old shares were held entirely by members of the Iwasaki family, only half of the 500,000 new shares were allotted to former stockholders; of the remainder, 15,000 were reserved for employees, and 235,000 for the public. The new shares, it was announced, would for the first time be listed on the Tokyo Stock Exchange.

Following is the balance sheet of the Mitsubishi Bank as of December 31, 1928. As mentioned above, this bank was the only one of the "Big Five" to show an increase in profits during the second half of 1928.

Proposed Merger With Morimura Bank

Announcement was made in February, 1929, of the signing of a provisional contract for merger between the Mitsubishi Bank and the Morimura Bank. The latter institution is reported to have an authorized capital of Y.5,080,000, (Y.2,080,000 paid up). While organized as a joint-stock company, it has really been a family institution maintained by the Morimura family. For several years close relations with the Mitsubishi Bank have been maintained through the banks' directors. The Morimura Bank at the time of this announcement had deposits of approximately Y.27,500,000 and advances of 18,000,000.

Dai-Ichi Ginko, (Ltd.)

Soon after the Restoration, when the great merchant families were first appearing in their new guise of banking houses and the Mitsui-gumi desired to establish a national bank of its own, the Government won them over to a scheme whereby a national bank would be jointly established by the Mitsui-gumi and the Ono-gumi. A joint application by the two companies having been made, approval was granted by the Government in June, 1872. As a result the First National Bank was established in 1873, as the Dai-ichi Kokuritsu Ginko. (First National Bank), with a capital of Y.2,440,800, of which Y.1,000,000 each was subscribed by the Mitsui-gumi and Ono-gumi. The bank opened for business on July 20. When the national banks were abolished this institution, in 1896, became the Dai-ichi Ginko, (Ltd.), sometimes spoken of as the First Bank, (Ltd.), and continued business as an ordinary bank, with an increased capital of Y.4,500,000.

Since 1878, when a branch was established in Fusan, the Dai-ichi Ginko has been identified with Chosen, (Korea). It received the right of note issue in that country in 1901, relinquishing the privilege to the then newly organized, semi-official Bank of Korea in 1909. As in the case of several other banks, the Imperial Household Department is owner of 5,000 shares of stock of the Dai-ichi Bank. In 1912 the Dai-ichi Bank absorbed the Twentieth Bank, (Ltd.), and in 1913 the Commercial and Industrial Bank of Kyoto. Besides the head office, the bank has six branches in Tokyo. There are 27 additional branches in Japan and two in Chosen, (at Seoul and Fusan). In 1917 an extensive system of foreign correspondents and agents was arranged, whereupon the bank became widely interested in foreign trade and exchange.

Financial Status

During the crisis of 1927 the Dai-ichi Ginko, on April 30, absorbed the Tokai Bank, with 13 branches in Tokyo and 11 elsewhere in Japan. By this merger Y.7,500,000 were added to the paid-up capital, bringing the total to Y.57,500,000. The usual dividend of 13 per cent., paid up to the end of 1926, was reduced to 11 per cent. in 1927, in keeping with the understanding among Japanese banks generally following the panic. Actually, earnings were ample to have paid the 13 per cent. dividend, (Y.3,737,500 for the half year), as the net profit for the term ending June 30, (1927), was Y. 6,175,000.

At the end of 1928 the Dai-ichi Ginko, (Ltd.), showed an authorized and paid-up capital of Y.57,500,000, reserves of 61,600,000, and deposits of Y.597,300,000. Total assets and liabilities were 750,917,473. Net profits for the year were Y.9,849,562. Dividends are paid at the rate of 11 per cent. per annum.

Sumitomo Bank, (Ltd.)

The "House of Sumitomo" traces its history to the nineteenth year of the Tensho Era, (A D. 1591), when it was engaged in copper refining and the extraction of gold and silver from auriferous and argentiferous copper by methods learned from a Dutch trader. In the days of the Shogunate the Sumitomos advanced loans to feudal lords and merchants in Osaka. The Sumitomos thus have a long and creditable history, but, unlike some of their contemporaries, they have had little connection with the Government.

The Sumitomo family is known to be very rich and very conservative. It operates through the Sumitomo Goshi Kaisha, a holding company capitalized at Y.150,000,000. This company, in addition to the bank and the trust company, controls various mines, a warehousing company, a steel spike and copper works, a steel works, a wire and cable factory, a fertilizer company, a building company, a colliery, and a life insurance company. Most of these bear the name Sumitomo. It also controls the well-known Sumitomo Besshi Mine, (paid-up capital, Y.15,000,000), and the Tosa Yoshinogawa Hydro-Electric Power Co., (subscribed capital, 5,000,000).

Reorganization and Growth

Beginning with the reorganization of the Sumitomo Bank as a joint-stock company in 1912, the Sumitomo Steel Works were similarly reorganized, (1915), followed by the electric wire and cable works, (1920); the warehouse company, (1923); the fertilizer company, (1925), and the steel-tube and copper works, (1926). The Sumitomo Goshi Kaisha was established in 1921, and took over all the Sumitomo interests including the Besshi Copper Mine in Shikoku, first exploited in A.D. 1691. The Sumitomo Building Co., was organized in 1923, and the Sumitomo Trust Co., (Ltd.), in 1925. In the same year the Hinode Life Insurance Co., (Ltd.), was acquired.

Although there has been no important addition to the Sumitomo interests since the 1927 banking crisis, press reports indicate that several firms in which the Sumitomo family is at present interested will shortly come under their control. Those mentioned are the Fuso Marine & Fire Insurance Co.; the Wakayama Warehouse; Nippon Electric Co.; Hanshin Electric Railway Co.; and Kyushu Electric Trolley Co. The Sumitomo Bank absorbed the Kurume Bank, (capital Y.300,000), in March, 1928. It was reported that the Sumitomo interests invested heavily in the Japan Victor Talking Machine Co. in February, 1929.

The Sumitomo Bank has always enjoyed an excellent reputation in Japan. It was established in Osaka as a private bank in 1895. In February, 1912, it was reorganized as a joint-stock bank. In 1920 the paid-up capital was increased from Y.26,280,000 to Y.40,000,000 and in 1921 to Y.50,000,000. At the end of 1928 it had a subscribed capital of Y.10,000,000, Y.50,000,000 paid up; reserves were Y.27,620,000 and net profits for the preceding half year Y.3,132,201.45. (Profits for the first half of 1928 were approximately Y.3,268,000, and for the second term of 1927, roughly, Y.3,686,000). As in the case of other Japanese banks, the balance sheet showed the results of greatly swelled deposits. These at the end of 1928 totaled Y.642,862,109.49; loans were Y.291,113,183.46; bonds, debentures and securities on hand, Y.235,690,620.73 (over 28 per cent. of the total assets); and bills discounted, Y.104,095,686.56. Total assets and liabilities were Y.825,890,024.34. Dividends, which were paid at 10 per cent. prior to 1927, have since then been paid at the rate of 9 per cent.

Yasuda Bank, (Ltd.)

The Yasuda Bank, like numbers of other important banks in Japan, is the creation of one individual. It has long been especially active in the rehabilitation of banks and other companies which would otherwise have been forced into liquidation. Operating in close relation to the central bank and borrowing from that institution when necessary, it has brought about results which would never have been attempted by the Bank of Japan on its own initiative. Succeeding a business established in 1864, the Yasuda Bank, (Ltd.), came into existence in November, 1923.

At the time of the Restoration of the Yasuda Co. was a small concern dealing in eggs, dried bonito, etc., and exchanging money at Ningyocho, Nihonbashi, in Tokyo. The firm afterwards became a bank, subsequently acquiring a number of small local banks which were in unsound condition. In 1923 the banks in the Yasuda group numbered 21, with total deposits of Y.812,000,000 or 12 per cent. of all deposits in banks belonging to the Bankers' Association. In 1923, 11 banks were amalgamated, and the present Yasuda Bank thus was brought into existence with a capital of Y.150,000,000, 92,750,000 paid up. Its first semi-annual statement issued as of

December 31, 1923, showed the following principal assets: "Call loans, advances, and bills discounted," Y.564,000,000; and "bonds, debentures and securities," 158,900,000. "Current account and other deposits" were 564,900,000, and "reserve funds," 45,400,000. Gross profits for the half year were 54,100,000. Despite a loss of 1.2 million through the earthquake, the bank declared a 12 per cent., (p.a.), dividend of Y.5,565,000. At the end of 1923, 11 banks, (not counting those amalgamated), were listed as affiliated with the Yasuda Bank. They had total paid up capital and reserves Y.43,600,000, deposits of 286,700,000 and total resources of 345,600,000.

On December 31, 1928, the Yasuda Bank, (Ltd.), had an authorized capital of Y.150,000,000, 92,750,000 paid-up. Reserves totaled Y.62,032,801.21, deposits Y.721,945,616, and total assets and liabilities Y.995,385,614. Dividends are now paid at the rate of 10 per cent. per annum. Net profits, which were Y.6,032,000 for the second half of 1928, showed a decrease of approximately Y.568,000 over the previous half year.

Financial Position

The Yasuda Bank led all other Japanese banks at the end of 1928 in the amount of its deposit holdings. These, at Y.721,900,000 compare with 642,900,000 for the Sumitomo Bank, the nearest competitor.

Electrical Development in Chekiang

Electrical enterprises in Chekiang are fast growing in number. According to a recent survey over 109 plants are now operating in the province, their total combined capital being estimated in the neighborhood of $5,317,620. The aggregate generating capacity as calculated amount to 15,617 kW. and their distribution runs as follows:

District Formerly Under	Total Generating Capacity in kW.	Total Capital Invested
Chien Tang Circuit	10,957	3,483,870
Hui Chi Circuit	3,017	1,249,600
An Hai Circuit	1,091	271,600
Kin Hwa Circuit	552	312,550
	15,617	5,317,620

The district formerly under Chien Tang Circuit, lying between Tai Hu and the Chien Tang River, is most developed as it possesses the advantage of reaching outer ports by means of its water front. Hangchow, the capital of Chekiang, is located along this belt. This is another advantage to be added to the reasons that account for such extensive electrical development in the district. In fact, Hangchow ranks first in point of generating capacity. The plants installed in Hangchow have a total generating capacity of 6,980 kW. This occupies about 45 per cent. when compared with the figure for the province. It is estimated that a sum of $2,000,000 has been spent for building and reconstruction purposes.

Plants generating over 150 kW. are nine in number as shown in the following:

Location of Plant	Generating Capacity in kW.
Hangchow	6,980
Ningpo	1,600
Huchow	1,600
Kashing	245
Nanziang	200
Hsiashih	280
Yuhang	340
Shaohing	440
Yungkja	752
Total	12,437

Plants that generate capacity varying from 1 to 150 kW. are scattered all over the province. Their distribution runs as follows:

Generating Capacity in kW.	No. of Stations	Percentage Comparison with Total No. of Stations	Total in kW.	Percentage Comparison with total Generating Capacity	Total Capital
1—25	45	41.2	622.3	4.0	$297,100
26—50	28	25.7	1,065.4	6.8	642,650
51—75	14	12.8	816.0	5.2	453,110
76—100	5	4.6	426.0	2.7	219,000
101—125	1	0.9	120.0	0.77	60,000
126—150	1	0.9	130.0	0.83	40,000
Over 150	9	8.3	12,437.0	79.70	3,604,000
Unstated	6	5.6	—	—	—
Total	109	100.0	15,616.7	100.00	5,315,860

The current is largely used for lighting purpose. There are altogether 443 motors capable of generating 2,909 H. P. The total population in Chekiang, as surveyed recently, is estimated at 20,630,000. Based on this calculation the supply of electricity does not measure up to the standard for the province. On the average, each person in Chekiang uses only 2 units per year while in the United States each person consumes 800 units.

A plan has been worked out with a view to constructing and installing new plants for the purpose of increasing the supply of current. The plan is to divide the period from 1923 to 1938 into stages as shown in the following:

Stage	Period	Generating Capacity Installed (in kW.)	Kilowatts Per Capital at End of Each Period
First	1919-1923	50,000	413
Second	1924-1928	90,000	147
Third	1929-1933	130,000	76
Fourth	1934-1938	280,000	38

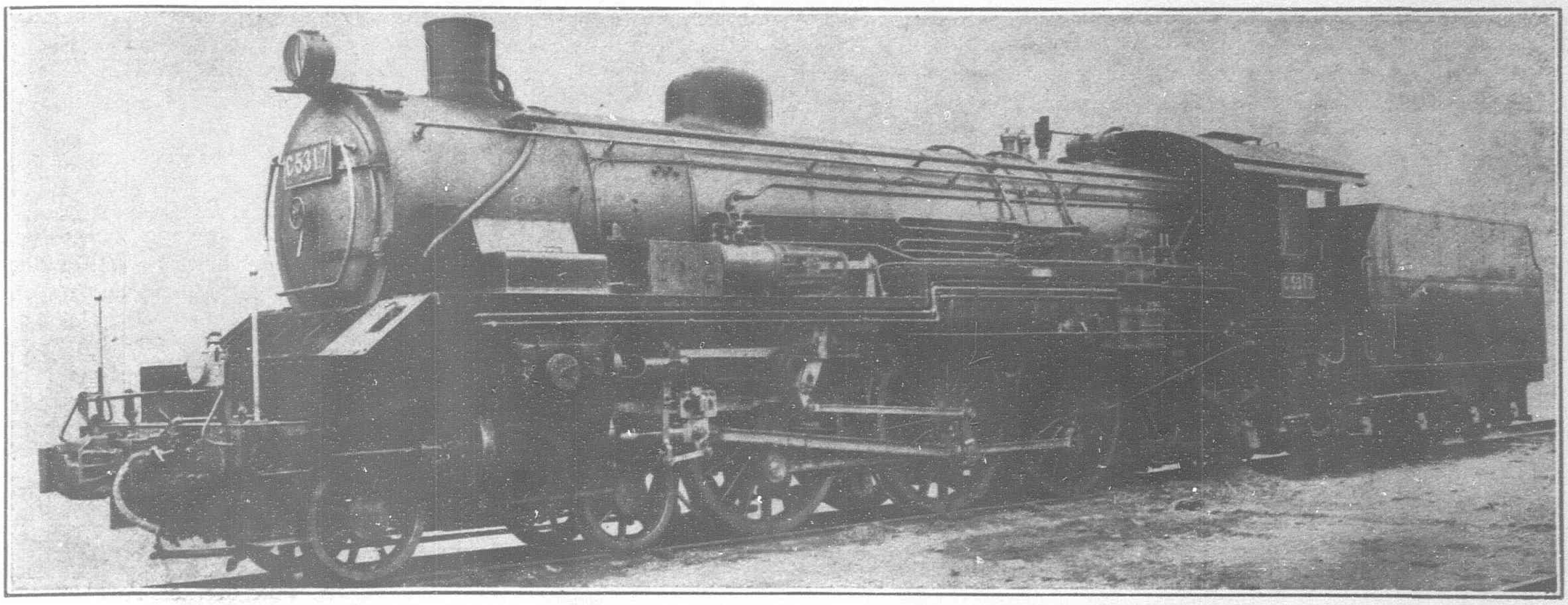
The plants installed in Chekiang may be roughly classified into plants driven by either steam or water power as shown in the following:

Location of Steam-driven Plant and Its Generating Capacity

Location	1st. Stage (in kW.)	2nd. Stage (in kW.)	3rd. Stage (in kW.)	4th. Stage (in kW.)	Total Generating Capacity (in kW.)
Hangchow Power Plant	5,000	—	—	—	5,000
New Power Plant (in Hangchow)	30,000	15,000	15,000	15,000	75,000
Changhing	—	15,000	15,000	45,000	75,000
Kashan	—	15,000	30,000	55,000	100,000
Pakkwanchen	—	—	15,000	30,000	45,000
Ningpo	—	15,000	15,000	20,000	50,000
Ninghai	—	—	—	20,000	20,000
Wenchow	—	—	25,000	25,000	50,000
Linhai	—	—	—	30,000	30,000
Total	35,000	60,000	115,000	240,000	450,000

Location of Waterpower-driven Plant and Its Generating Capacity

Location	1st. Stage (in kW.)	2nd. Stage (in kW.)	3rd. Stage (in kW.)	4th. Stage (in kW.)	Total Generating Capacity (in kW.)
Chien Tang River and its Vicinity	15,000	15,000	—	30,000	60,000
An Kiang River and its Vicinity	—	15,000	15,000	10,000	40,000
Total	15,000	30,000	15,000	40,000	100,000
Grand Total	50,000	90,000	130,000	280,000	550,000



Type C-53: Largest Locomotive for Passenger Service on Imperial Japanese Government Railways

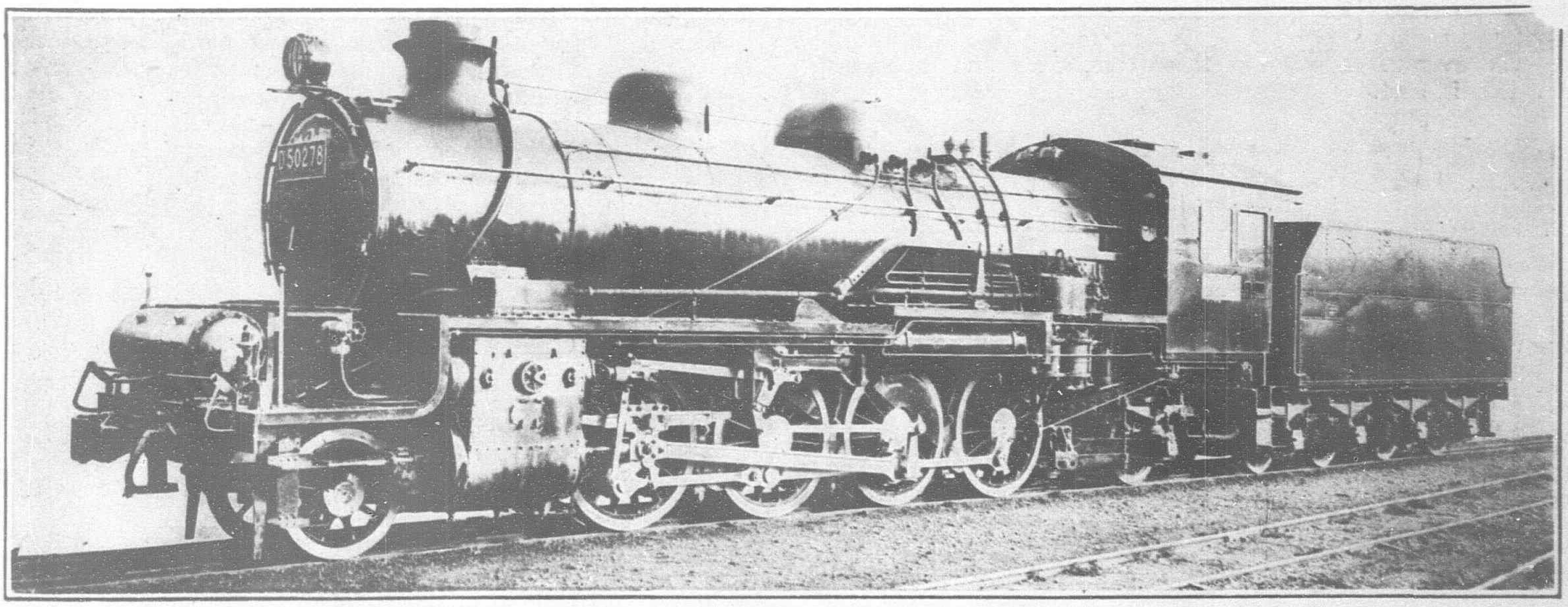
3 CYLINDERS

Development of Rolling Stock of Japanese Government Railways

Paper By Kiichi Asakura, Chief of Rolling Stock Section, Department of Railways

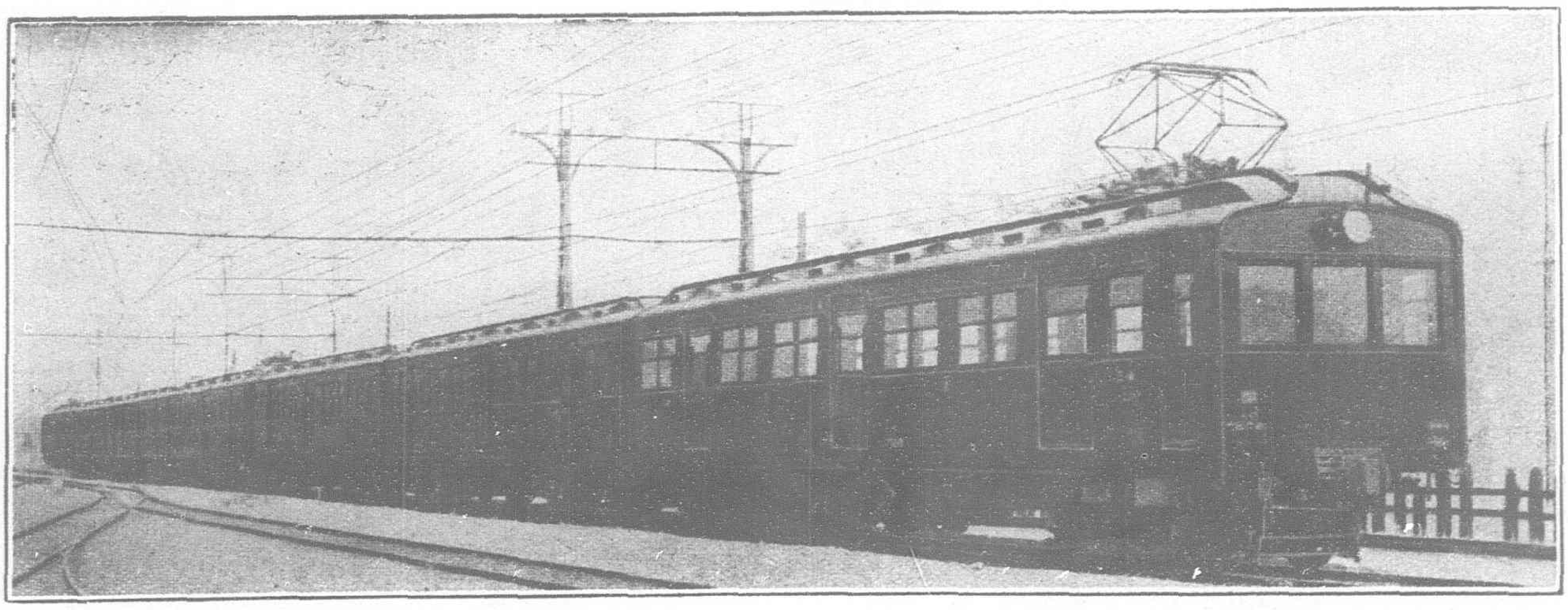
The rolling stock of the Government Railways, when taken over from seventeen companies according to the Railway Nationalization Law was of numerous types. For instance, in 1912, there were 190 types of steam locomotive, though the total number of the locomotives was only 2,340. After nationalization, efforts were made to reduce the number of types by scrapping the old ones, and, at the same time, the standardization of the rolling stock and its parts was begun. This was executed with good results in connection with the policy of building the rolling stock in Japan.

The passenger and freight cars were built in the infant stage of our railways, both at the railway works and at the car builder's works. But wheels, axles, springs and other essential materials were imported. The building of steam locomotives was begun as early as 1893, but only a few locomotives were built in home works, until in 1912 all new locomotives required by the Government Railways were ordered from home manufacturers. The materials and the essential mountings, etc., for these locomotives were, however, generally imported. The world war accelerated the development of the steel industry and machine manufacture in Japan, so that we were capable of supplying all the materials needed. The manufacture of electric equipment for electric cars was also begun at this time. Electric locomotives for the main line service have also been built in Japan for several years. Gasoline motor-cars have recently been built. Thus all the rolling stock as well as the materials required by the Government Railways are



Type D-50: Largest Locomotive for Freight Service on Imperial Japanese Government Railways

2 CYLINDERS



All Steel-Car Electric Train for Suburban Traffic

supplied by the home works, according to the standards of the Government Railways. This method of supply greatly aids in keeping the rolling stock parts uniform, and this, in turn, expedites repair of rolling stock.

Number of Rolling Stock

The first line of the Japanese Government Railways was started in 1872 with 10 locomotives, 58 passenger cars and 75 freight cars. The numbers of rolling stock have steadily increased in accordance with the demands of traffic. At the end of 1928, the figures were as tabulated herewith :

		Saturated steam	Superheater loco.	Total
Steam locomotives	Tank loco	1,069	43	1,112
	Tender loco.	493	2,374	2,867
	Total	1,562	2,417	3,979

The average weight of these locomotives is 77.08 tons.

	Adhesion	Rack	Total
Electric locomotives	71	28	99

The average weight of these locomotives is 65.38 tons.

		Wooden car	Steel car	Total
Passenger Cars	4 Wheel	2,156	—	2,156
	4 wheel bogie	6,372	847	7,219
	6 wheel bogie	499	102	601
	Total	9,027	949	9,976

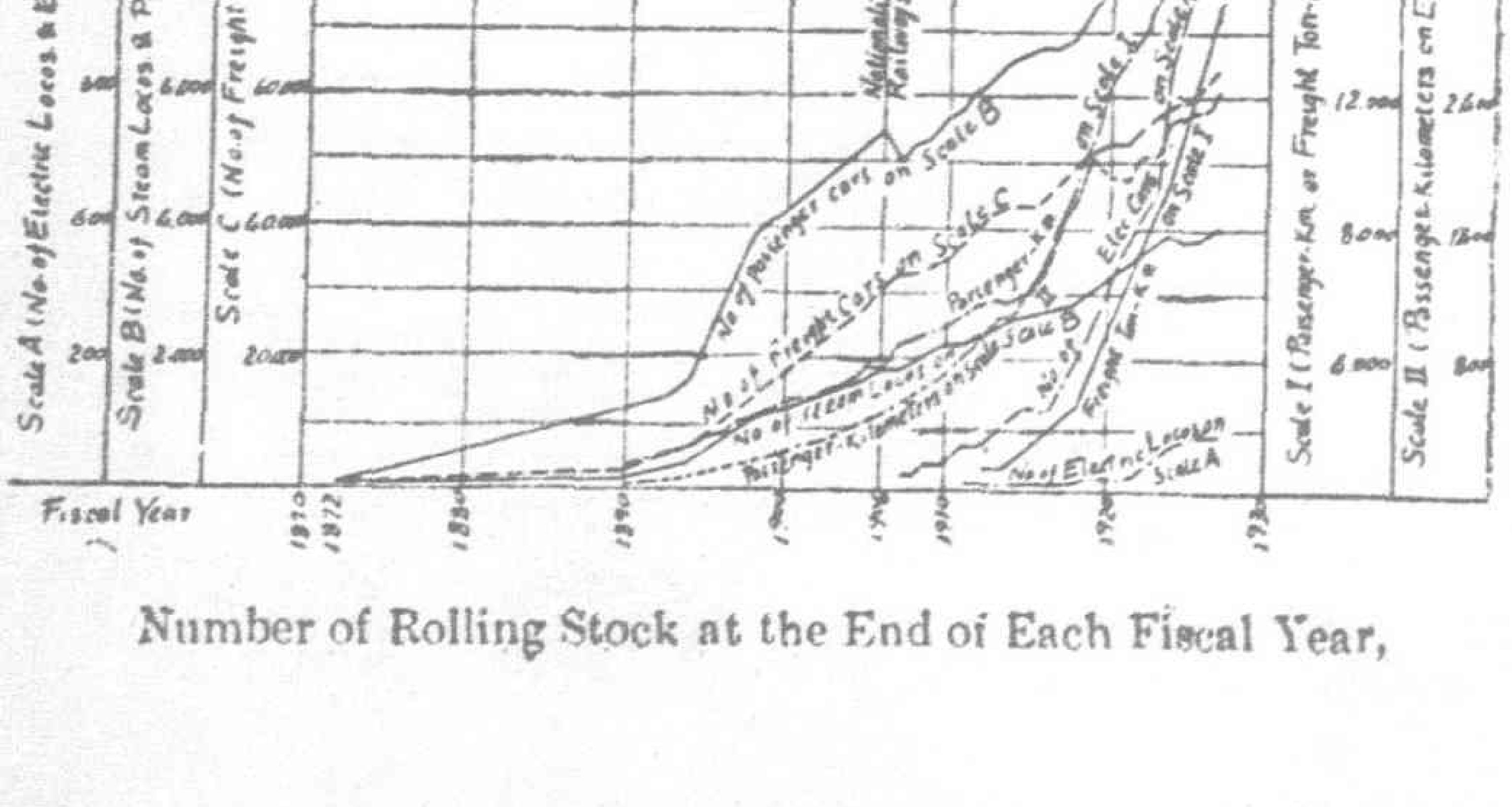
The average number of seats in these cars is 52.5.

		Wooden car	Steel car	Total
Electric cars	Motor car	281	155	436
	Trailer	438	53	491
	Total	719	208	927

The average capacity of these cars, seats and handstraps included, is 98.4.

Freight Wagons	Box	36,340
	Gondola	33,380
	Coal	5,673
	Total	65,393

The average capacity of these wagons is 12.8 tons.



Number of Rolling Stock at the End of Each Fiscal Year,

The number of rolling stock at the end of each fiscal year is shown on the annexed diagrams. The increase of traffic at the time of the world war was very rapid, and it was hard to build cars to fulfil the demand. Thus the increase of cars was rather uniform when compared with the increase of traffic. The shortage of rolling stock was compensated by its efficient use. In 1928, the passenger-kms. per car per day was 6,060, and capacity of freight car per million ton-kms. was 102 tons. These figures differ very much from those of foreign railways.

Classification and Nomenclature of Rolling Stock

The classification and nomenclature of rolling stock were revised in 1928 as follows :

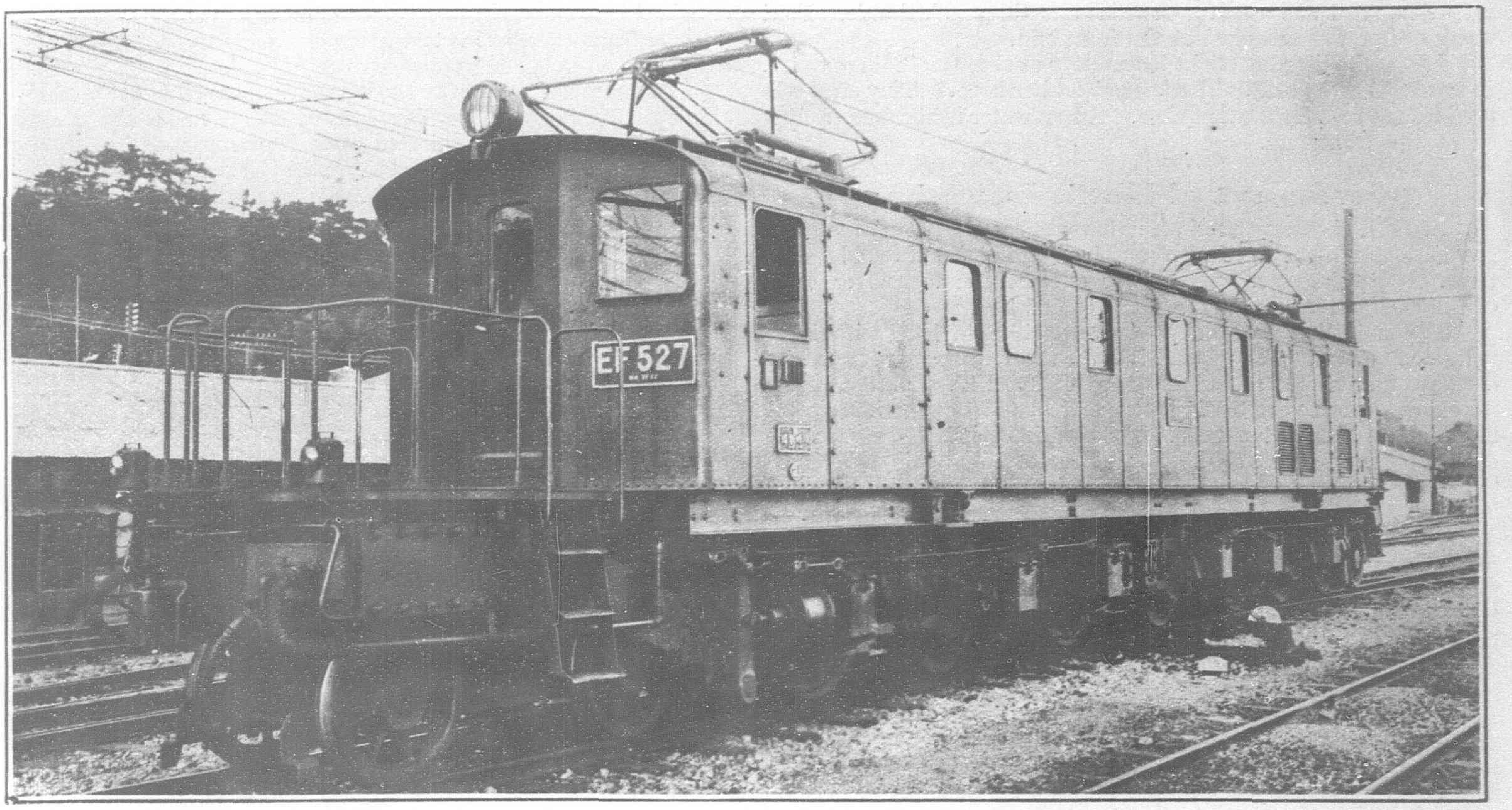
To express the wheel arrangement of the locomotive the German system was adopted though the Whyte system had been used for a long time. This was due to the inconvenience of the latter system for the electric locomotive. The class or type of the steam locomotive is expressed with a single letter and a number of two figures. The letter is B, C, D or E according as the number of driving axles is two, three, four or five. The numbers below 50 indicate tank locomotives, while those of 50 and above denote tender locomotives. The numbering of each locomotive is expressed by joining a number commencing from 1 to the type number. For instance, C50 is a type of tender locomotive having three driving axles. C5022 is the 22nd locomotive belonging to type C50. In the case of electric locomotives, E is prefixed to the letter expressing the number of driving axles. The numbers below 50, in this case, indicate that the locomotive is a freight locomotive, the maximum speed of which is limited to less than 65 km/h. The numbers 50 and above denote passenger locomotives.

The numbering of passenger cars is indicated by two Japanese characters and a number. The first character expresses one of seven groups classified by tare. The second character expresses the class of the car. The number has a certain relation to the size of the car, etc. The numbering of freight cars consists also of two Japanese characters and a number. The first character expresses the kind of car, the second, the loading capacity. The numbers begin from 1 in each group expressed by the two characters above-mentioned.

Development of Steam Locomotives

For a long time the 2B type locomotive was the commonest type of passenger locomotive. In 1911, 2C, type and 2C1 type locomotives were introduced for the express service on the main line. In 1919, a 2C1 type locomotive, having driving wheels 1,750 mm. in diameter, was built in Japan and was used for the main line express service. In 1928, a still bigger 2C1 type three cylinder locomotive was built to replace the former.

The standard freight locomotive in the pre-nationalization era was the C1 type tank locomotive. After 1913, the 1D type locomotive was built as standard freight, until, in 1923, the 1D1 type was introduced as the new standard for main line freight service. Meanwhile several other kinds of locomotives, both passenger and freight, were built.



One of Seven Express Passenger Electric Locomotives, Type EF 52 Designed and Built at the Shops of the Imperial Government Railways of Japan

Thus the size of locomotives grew year by year as is seen from the following table.

Fiscal year	Number of locomotives	Average weight in working order: tons	Average adhesive weight: tons
1891	239	40.73	26.12
1895	430	43.40	28.19
1899	1,062	48.68	28.84
1903	1,372	50.07	28.98
1907	2,062	51.58	32.10
1911	2,272	52.92	31.97
1915	2,680	57.24	34.14
1919	3,089	63.69	37.01
1923	3,745	69.42	39.06
1927	3,924	77.89	41.51

The 2C type, introduced in 1911, was the first locomotive equipped with Schmidt's superheater. From this time all the new locomotives, with but few exceptions, were so equipped. When the superheater was first introduced, the proportion of the superheater area was just as given by the Superheater Company. But now our practice is to make the superheater area more than 35 per cent. of the evaporating heating surface. The feed water heater was introduced several years ago. Several kinds were tested, and we decided to use the closed type, heated by the exhaust steam and placed on the delivery or suction side of the feed pump, the heater, in the latter case, having an ample capacity of water.

As to the construction of the locomotive, the bar frame is now preferred. Walschaert's valve gear has been extensively used since nationalization. A double ports piston valve was used for the superheater locomotive, but recently a single port was adopted.

We used to build new locomotives for main line services and to put old locomotives on the secondary lines. But new secondary lines being constructed year after year, there is need of efficient locomotives of smaller size. Such locomotives are also required for the frequent service of small trains. We are considering for this purpose steam tank locomotives and Diesel locomotives. Diesel locomotives are much preferred for the sake of smoke abatement in tunnel sections, which are so common in Japan. The most improved Diesel geared locomotive and Diesel electric locomotive each equipped with a 600 H.P. Diesel engine, were purchased for making the test. For traffic of very small amount we are trying to use the gasoline engine, in the form of gasoline motorcars. For the first trial, four-wheeled cars, equipped with 40 H.P. engines were built in 1929. The adoption of internal combustion engines for traction purposes on the Government Railways on a greater scale is foreseen.

Description of Typical Steam Locomotives

Chief dimensions of typical steam locomotives are given below :

Type	C50	C51	C53	D50
Wheel arrangement ...	1C	2C1	2C1	1D1
Boiler pressure, kg/cm^2	14	13	14	13
Cylinder, no. × dia. *mm* × stroke *mm* ...	2×470×610	2×530×660	3×450×660	2×570×660
Grate area, m^2 ...	1.61	2.53	3.25	3.25
Total heating surface (fire side), m^2 ...	111.0	167.8	220.4	222.2
Superheating surface, m^2	28.8	41.4	64.3	64.3
Dia. of driving wheel, mm	1600	1750	1750	1400
Adhesion weight, tons	44.70	42.20	46.27	58.79
Weight in working order, tons	53.00	66.30	80.98	78.14
Coal capacity of tender, tons	6	8	12	12
Water capacity of tender, tons ...	13	17	17	17
Weight of tender in working order, tons	34.50	44.20	49.00	40.00

The C50 type locomotive built since January 1929 is for local passenger service. This is the improved design of the former 1C type locomotive used since 1918 and found satisfactory. The frame is of bar type cut from thick plate, which is the standard practice for the bar frame manufacture in the Government Railways. A long travel is given to the piston valve to get 85 per cent. maximum cut off. A feed water heater is arranged at the front end of the tender.

The C51 type locomotive, built since 1919, is for passenger and express service. This is the first locomotive with driving wheels of so large a diameter as 1,750 mm.—which may be the biggest driving wheel in the world on a narrow gauge locomotive.

The C53 type locomotive was built after 1928 and is used for express trains on the main line. The number of cylinders being three, the balancing of the engine is good, and thus we can use a still bigger boiler than that of the previous type locomotive upon driving wheels of 1,750 mm. diameter. Of course, every possible means was taken to lower the height of the center of gravity. The height is estimated to be 1,587 mm. and therefore its ratio to the width of the track gauge is 1.49. The frame is of bar type. Carbon vanadium steel was used for the rods and the cranked axle. Feed water heater was arranged at the front end.

D50 is the biggest freight locomotive used for main line service. It was built after 1923. The frame is of bar type. Alloy steel was used for the rods for the first time. A feed water heater was equipped at the front end.

Development of Electric Locomotives

In 1911, the first electric traction was carried out on the steep gradient section of 1 in 15 with combined adhesion and rack locomotives. 600 volts d.c. system was adopted here. The capacity of the locomotives ranges from 420 to 525 kW.

The main line near Tokyo was electrified in 1925 with 1,500 volts d.c. system. The locomotives for the local passenger service here are four motor articulated type of 820 kW. capacity, those for express service are of six motor articulated type or four motor independent axle drive type. The freight locomotives range in capacity from 820 to 975 kW. 59 locomotives among 69 locomotives here used were supplied by six foreign makers and are of 14 kinds. The inconvenience caused by such a condition led us to decide to build the locomotives further needed in the home works from common drawings. Four prominent Japanese makers have united, jointly with the co-operation of the Government Railways, to design the locomotives which were to be built in their respective works. 2CC2 type express locomotives, named EF52 type, were thus built, the description of which is given below. The locomotive has articulated trucks, each truck having three driving axles and 4 wheel bogie. Six traction motors are mounted on each driving axle by nose, and the power is transmitted through single reduction gearing. The capacity of the locomotive is 1,350 kW. The weight is 108 tons. The control system is of electro-pneumatic unit switch type and arranged to give three stage controlling. The control current is of 100 volts. The greatest care was taken in the arrangement of machines and apparatus, so as to have convenient inspection and handling.

Development of Passenger Cars

In the earlier days of railways in our country, there were exclusively 4 wheel cars, all of very small seating capacity, a third class car having seats for only 30 passengers. About 1875, the first 4 wheel bogie cars were introduced, but 4 wheel cars still remained in general use. As since the nationalization of the railways, scarcely any 4 wheel cars have been built, and some of those built have subsequently been scrapped, they will disappear in course of time.

In 1909, the standard size of the passenger cars was determined, and, in 1919, a new standard was introduced. Up to 1926 the car body was built of wood, the underframe and truck being of steel, but, in order to ensure the safety of traffic, it was considered desirable to adopt metallic construction of the car body and it was decided that no wooden cars should be constructed in the future. The first steel car was put into service in 1927 and has proved quite satisfactory. The chief dimensions of the new and old standard cars are given below:

		Standard 1909		Standard 1919		Steel cars	
		4 WB Car	6 WB Car	4 WB Car	6 WB Car	4 WB Car	6 WB Car
Length between coupling surfaces	mm	16,782	19,983	16,860	20,016	17,000	20,000
Length over headstocks	mm	16,408	19,608	16,400	19,600	16,500	19,500
Width max.	mm	2,705	2,705	2,900	2,900	2,900	2,900
Width over outside panels	mm	2,591	2,591	2,800	2,800	2,805	2,805
Height above top of rail	mm	3,778	3,778	3,924	3,924	3,925	3,925

Attention should be drawn here to the fact that, in spite of the narrow gauge, the width of the car body is greater than that of the standard car of some of the European railways.

As is seen from the previous table, there were two standards of passenger cars with respect to their length, *viz*, 20 meters for 6 wheel bogie cars and 17 meters for 4 wheel bogie cars. Sleeping, dining and observation cars, as well as cars in the service of special limited expresses, were mounted on 6 wheel bogies for the sake of smooth running rather than because of wheel load requirement. But the consideration that 4 wheel bogie cars, if provided with the same length as 6 wheel bogie cars, *i.e.*, 20 meter length, would run as smoothly, led us to trial runs which were carried out in September, 1927. A 20 meter car body put on 4 wheel bogie was run in a train and compared with 20 meter 6 wheel and 17 meter 4 wheel bogie cars. The result of the recorded vibration showed that the 20 meter car with 4 wheel bogies behaved far better than the 17 meter standard cars in smoothness of running and nearly matched the 6 wheel bogie cars. This test made us decide to adopt a 20 meter length for all kinds of passenger cars.

The number of seats of the standard third class car was 80 in standards 1909 and 1919, whereas that of the 20 meter new standard car is 88, and the space allotted to each passenger is increased by about 10 per cent. The seats of the second class car of 1909 standard were lengthwise, but from the 1919 standard the crosswise arrangement could be adopted owing to the greater width of the car.

Bogie trucks of American type with equalizers have been used for a long time as standard. Though the detailed construction was several times improved to get better riding, the type remained the same during twenty years. But recently a new design, similar to those on Pennsylvania Railroad, without heavy equalizers, thus lessening the unsprung weight, has been drawn up. The new type will come into use in 1929.

Standard Steel Cars

When the steel car was designed for the first time, it was carefully considered whether it would be better to adopt an all steel or semi-steel car, and we decided to use wood for the roof, floor, inside finish and furrings, etc. There would be no danger of catching fire in accidents, as our cars are heated with steam and lighted by electricity.

Center sills of fish-belly form have been provided to resist the end shock, as well as to carry the vertical load. This construction was adopted up to 1928. But experiments with actual cars taught us that the steel side framing could carry most of the vertical load, and therefore we replaced fish-belly center sills with channels of equal section sufficient to take up the end shock in our new cars, which are to be in service in 1929. With this new construction much of weight and labor saving is foreseen.

Posts and piers are of pressed steel and outside sheathings are of plates, 2.6 mm. in thickness. Copper bearing steel is under test in a number of cars. The roof is after the monitor type, affording convenient room to Garland type ventilators of ample capacity. The outside panels are well coated with oil paint or Japanese "urusi" (lacquer), which latter has proved to be an excellent protector on wooden cars for the past many years. A thick layer of hair felt is applied inside the steel panels as a heat insulator. The ceilings for the cars of all classes are headlined with plywood plate and pleasingly enamelled white or cream.

The arrangement of seats is after the American plan, having a center aisle, and at the ends are enclosed platforms provided with enclosed vestibule diaphragms. The seats of third class cars are upholstered with a number of springs and covered with mocket plush, the seat backs and armrests being of wood. The seats of second class cars are covered with mohair plush, the seat backs being covered with the same and comfortably puffed. The seats of the second class cars for local train use have fixed back, but those for through trains have reversible backs.

Second class sleeping-cars are after the Pullman car type with a center aisle, but first class sleepers are arranged in compartments with a side corridor, after the style of continental cars. Dining-cars are arranged similar to American and continental diners and have an inviting appearance.

Though the pressure steam system of car heating was used for a long time, vapor or atmospheric pressure steam system was adopted several years ago.

The train lighting is of electricity of 24 volts after Stone's system of axle driven dynamos and batteries.

Air brakes of the most improved design are used for the steel cars. The adoption of the air brake enabled us to equip cars with water tanks of ample capacity suspended under the underframe and to equip the toilets with flush valves. In former days roof tanks were used, which were very inconvenient for the water supply.

Development of Electric Cars

Electric cars are operated on the lines through Tokyo and in its suburbs, 103 km. in length. Though the first electric car was run in 1904, the increase of the traffic was rather slow, but since the world war traffic grew rapidly, and now six to eight bogie car train runs every two minutes in the rush hours. 1,500 volt d.c. is now the standard electric system, though formerly 600 volts and 1,200 volts were partially used. The train consists usually of an equal number of motor-cars and trailers, so that one motor-car and one trailer may be considered as making one unit. The motor-car has four wheel bogie trucks. 100 kW. motor is mounted on each axle, *viz.* 400 kW. motors are used for one unit or two cars. Therefore the starting acceleration is considerably high, it being about 1.6 km/h/sec. Formerly several kinds of motors were supplied, but since 1925 only the standard motors have been supplied, which were designed jointly by the principal makers with the co-operation of the Government Railways and are manufactured according to common drawings. The motor is the four pole self-ventilated type and its one hour rating is 100 kW. with 172 amperes in 653 r. p. m., the terminal voltage being 675. The control equipment is multiple unit electro-pneumatic cam shaft system. The control current is 100 volts and is supplied from a 1.5 kW. constant voltage motor generator. The new cars are of steel construction, 17 meters long over couplers. They have three doors on each side, operated by electro pneumatic door engines. The seats for the third class car are arranged lengthwise and cars have a capacity of forty passengers. As there are many handstraps, the capacity of the car is more than a hundred passengers. The car has electric heaters. A motorman's room is provided at one end. The total weight of the motor-car is 38.7 tons. The trailer is of the same size and its weight is 26.1 tons.

Development of Freight Cars

Freight cars on the first lines built in 1872 were naturally of small units, the covered wagons being of 5-ton capacity and the open ones of 6-ton capacity. The ever-increasing freight haulage demanded far larger units of cars. At one time 7-ton capacity was the standard both for covered and open wagons. These wagons were reconstructed to have a capacity of 10 tons or more in connection with the standardization of the wheels, axles and bearing springs. With the adoption of the automatic coupler, the old cars having a capacity of less than 10 tons were abolished, and, at the same time, no wagons of the private companies having a smaller capacity than 10 tons were allowed to run on the Government lines.

As the standard for the new cars, 15-ton capacity has been adopted since 1915 both for covered and open wagons. The standard capacity of the new open wagons was increased, by increasing the length a little, to 17 tons in 1927, in order to equip them with two drop sides of proper size on each side. Principal dimensions of the present standard cars are given below :

		15 ton Box car	17 ton Gondola	12 ton Refrigerator	30 ton Hopper
Inside					
Length	mm	7,025	8,130	7,025	7,790
Width	mm	2,365	2,480	2,250	2,560
Height	mm	2,325	850	1,820	—
Capacity	*tons*	*15*	*17*	*12*	*30*
Volume	m^3	38.6	16.1	28.8	26.7
Light weight	tons	9.3	9.2	14.3	15.3
Wheel base	mm	3,900	4,200	3,900	—
Bogie center distance ...	mm	—	—	—	4,900
Total length between coupling surfaces	mm	7,830	9,030	7,830	8,710

15-ton Box car. Underframe of channel bars ; outside sheathings of sheet metal with wood lining inside, wood roofing and flooring in order to avoid heat accumulation in the car, injurious to certain kinds of goods. For the roofing some special canvas prepared with asphalt or asphaltic composite is used.

17-ton Gondola car. Provided with drop sides, two on each side, 3,985 mm. in length to facilitate unloading the car. Wood siding and flooring.

12-ton Refrigerator car. A new design of refrigerator cars was drawn up recently, and new cars were put into service in 1928. The car body is framed of steel with wood outside sheathing. The inside of the car is covered with galvanized sheet iron to make a water-tight vessel. The insulator is of cork plate, well wrapped up in water proof tar paper. Instead of end ice boxes, an old practice, four overhead ice tanks are provided just below the roof. Tests with this new type of refrigerator cars showed a remarkable economy of ice, and a uniformly low temperature was maintained through the trip. Thus far better results were obtained than with the old cars with end ice bunkers.

30-ton Coal Hopper cars. There are two kinds of hopper cars : side drop and bottom drop. The 30-ton car is of the former type and is of all steel construction, mounted on 4 wheel diamond trucks. The bearing springs of the diamond truck are usually of helical type, which causes rather serious rolling vibrations, especially when the height of the center of gravity is rather high in comparison to the width of the track gauge. Experiments showed that laminated springs ameliorated this condition to a considerable extent. Thus we have decided to adopt laminated springs for the diamond trucks of new design.

Standard Parts and Standard Design

The standardization of the rolling stock parts has been effected to a considerable extent for many years. For instance, boiler tubes, boiler fittings, lubricators, valves, brake parts, tyres, pipes, bolts and nuts, rivets, window glass, bearing springs, wheels and axles, axle boxes, etc. are all standardized. The standards have been or are to be revised in connection with the adoption of the metric system and the determination of the Japanese Engineering Standards. A rolling stock congress, comprising the leading engineers in charge of the rolling stock design, manufacture, repair and maintenance of the Government Railways, private railway companies and manufactures, is held twice a year, the first having been held in 1922. Discussions on the construction of locomotive and car parts are made at the congress and several problems are assigned to special committees for further investigation. Thus the congress has greatly aided the securing of standards.

Brief explanations are given about some of the standards.

(*a*) Wheels and Axles. Though there are several kinds of axles used for old type cars, most of the cars have one of the five standard axles, which are 7-ton short axle (7-tons being the bearing power), 7-ton long axle, 10-ton short axle, 10-ton long axle and 12-ton long axle. The short axle has the journal center distance of 1,574 mm and the long axle has 1,930 mm, or as long as the axle of the standard gauge car. The 12-ton axle is commonly used for cars recently built. The wheel has a cast steel spoked center and has the tyre, 860 mm in diameter, secured by a retaining ring.

(*b*) Bearing Springs. The dimensions and capacities of the bearing springs for the cars were standardized. As the freight car is usually a four wheeled car, the bearing spring is semi-elliptical. The passenger car is mostly of the bogie car type, and its bolster spring is elliptical, whereas the equalizer spring is helical. The stress hitherto allowed for the bearing springs was rather too high and often caused breakage. The load variation upon the bearing springs is bigger in the case of narrow gauge than in that of the standard gauge. This might have been one of the causes for the breakage of the bearing springs, but we have come to the conclusion, after many experiments about the elastic limit of the hardened spring steel, that the allowable stress ought not to be so high as is often allowed in foreign countries. Our recent practice for the laminated spring design is as follows :

		Locomotive	Freight car	Passenger and electric cars
Deflection		$\frac{5.5\,P(l\text{-}0.6\,e)^3}{nbt^3\,E}$	$\frac{5.5\,P(l\text{-}0.6\,e)^3}{nbt^3\,E}$	$\frac{5.3\,Pl^3}{nbt\,E^3}$
Stress		$\frac{5.5\,P(l\text{-}0.6\,e)}{nbt^2}$	$\frac{5.5\,P(l\text{-}0.6\,e)}{nbt^2}$	$\frac{5.3\,Pl}{nbt^2}$
Allowable Stress	Standard	3,500 kg/cm²	4,000 kg/cm²	4,000 kg/cm²
	max.	4,000 ,,	4,500 ,,	4,500 ,,
Test stress		8,000 ,,	8,000 ,,	8,000 ,,

Where $2P$=Load on the spring, b=width of the lamina.

t = thickness of the lamina. $2l$ = span.

n = number of the lamina $2e$ = width of the buckle.

E = modulus of elasticity.

Brakes

For a long time passenger trains were equipped with vacuum brakes, and freight trains, having no continuous brake, were controlled by the locomotive brake and a hand brake on the brake van. As, however, such means of braking cannot afford good control of a long train, and moreover, as the gradient condition of the Japanese railway lines needs a good brake, it was decided to equip freight cars with air brakes, and, in connection with this, to change the vacuum brake of the passenger train to the air brake. Thus the air brake equipment was added to the locomotive and freight cars, and freight trains are now controlled by the air brake though many freight cars have still to be equipped therewith. Passenger trains are partly controlled by air brakes, and it is intended to discard the vacuum brake entirely in the spring of 1931. Electric cars were equipped with the air brake from the beginning.

When we decided to use the air brake, it was a big question, what kind of air brake to adopt. The world-famous Westinghouse system was chosen, and two Japanese works began the manufacture of the air brake parts with the licence of the company. As the standard for the locomotive air brake, ET6 was adopted, and the K type triple valve was adopted for the freight cars. Though P type triple valve was adopted for the old type passenger cars, we were not satisfied with it for the modern passenger cars. The U valve is too heavy and expensive for our case, and so we have striven to get a new one, which is most suited to our conditions. After many experiments, we found that our new valve, which we name as A control valve, was quite satisfactory. We equip this valve for all our passenger cars, except old ones, and we believe that this valve may be used in any country with complete satisfaction.

Change of Coupler

In 1918, it was decided to change the screw and link couplings of the locomotives and cars into automatic coupler of the American type for the purpose of increasing the tractive power, eliminating the troublesome work of interchanging the screw and link couplings at certain junctions, saving the coupler hands required in the coupling work, energizing the coupling and uncoupling, reducing the repair cost and finally, as the most important item, minimizing the danger to employees. Thus the preparatory work was immediately begun for the locomotives and cars and it was completed in 1925. The change of coupler for the passenger car was effected in the period between July 1 and 10, 1925, except the couplers at each end of the train. The changing for all other cars and locomotives was accomplished on July 17, 1925 (in Island of Kyushu on July 20) by suspending the freight train service for one day, except for special freight trains.

The automatic couplers used were Sharon and Alliance types imported from U.S.A. As, however, the Shibata type coupler, which was designed and made in Japan, proved good, it is now generally used. For draft gear, a simple spring was used, partly because of lack of space for bigger draft gear and partly because of the expense. But the new cars are now equipped with the friction draft gear.

The result of changing the couplers is quite satisfactory. The number of deaths and injuries of employees has decreased to a remarkable extent, and the tractive force has been increased considerably.

Problem of Changing Track into Standard Gauge

The narrow gauge of 1,067 mm., might have been well suited to the early stages of development of the Japanese railway lines, but, as traffic has grown, the narrow gauge has been found inconvenient. Thus the problem of changing the track gauge into the standard gauge of 1,435 mm has been several times discussed and investigated. The last investigation was carried out in 1917, and if was recommended to widen the gauge of the whole line in a few years and to reconstruct the whole of the rolling stock at the same time. Some locomotive, passenger and freight cars were actually reconstructed and experiments were made to transfer the freight cars from one gauge to another by using the Breitsprecher's process, which was considered to be useful in certain junctions in the course of the reconstruction. The test result was satisfactory. From this time our standard for the car axle was changed and the so-called long axle was adopted. When this axle is used for the narrow gauge, the overhang of the axle beyond the wheel boss is rather long; but, by slightly increasing the diameter at the wheel seat, the stress acting upon the axle can be reduced to the value of usual practice. As the width of the car body is large, in comparison with the track gauge, the use of the long axle is very convenient for the construction of the car body. Thus the long axle is adopted as the standard, though the widening of the track gauge still remains a problem, mainly because of financial considerations.

The widening of the gauge to standard width would have a good effect upon the rolling stock. The steaming capacity of the narrow fire box type boiler could be increased 50 per cent. by the reconstruction. The capacity of the traction motor having the same diameter of armature, could be increased by not less than 50 per cent. Moreover, in general, the stability of the rolling stock would be greatly augmented, the vibration much reduced, and thus the maximum speed could be made as high as that of foreign railways. In fact, the narrow gauge is always a big handicap to the design and construction of our rolling stock, and the improvement and development thereof are thus greatly impeded.

Economics of Flood Control in China

(Continued from page 20.)

The new Shihshow dyke was constructed by first excavating a "muck ditch" 2,000 ft. long by 10 feet deep by 10 feet wide. Into this carefully selected clay was packed in order to make a water-tight core; and this core was carried up to the top of the dyke four feet above extreme high water. Immediately in front of this clay core, wooden sheet-piling, grooved and closely fitted, was driven to a depth of fourteen feet for a distance of 2,000 feet along the worst of this stretch. With this safeguard, a broad dyke with slopes of one on three was then built and faced with one-man-sized-stone riprap quarried at the nearby Temple Hills. This dyke did its work and stands as one of the samples of what may be accomplished along the Yangtze.

There is no one formula for curing the ills that beset China because of the floods in her rivers. While the well laid stone bunding along the north bank of the Yangtze just below Shasi seems to do its work well, it might not have the same success along some of the many bends a hundred miles down river. It is along this section near Cha Wan, where the serious dyke break of 1926 caused such losses to Hupeh farmers, that experiments are going forward this year with wire cages of stones laid down the sloping banks to retard cutting at bad bends.

Shansi's Fen Ho tears through the Taiyuan-Fenchow valley when in flood, and, melting its banks as though they were made of sugar, leaves its channel entirely at times and spreads its sand load over fertile fields, rendering them worthless. Little has been done to arrest these floods or to control them. Detention reservoirs are being tried. They are yet in the experimental stage; for the silt load will soon fill them and render them useless, unless a device can be arranged to keep the mud moving out through the bottom of the dam at the same time the main flood is being held back. The efficiency of such reservoirs remains to be proved.

This study of flood control in China is a most fascinating subject. Few engineers have had the opportunity to go far into the matter, because of the very limited funds thus far set aside for these undertakings. The more conservative practices, including stone and kaoliang groins and stone walls, have been adopted, but detention reservoirs are rare, indeed.

The innovation of importing a large American pile driver in 1923 to put a wooden trestle across the Yellow River in eastern Shantung, in connection with a rock-fill dam designed and built by the writer, caused no end of opposition at the time. It was a problem of throwing the entire flow of the Yellow River back into its old channel after it had broken through a dyke at a bend and started across country to the sea by another route. By methods similar to those used by American engineers in putting the Colorado River into the desired course, I went about this job. Instead of having the Southern Pacific Railway with standard-gauge tracks and steam shovels to furnish rocks for the fill, I employed four hundred river junks and dug the stone by hand in chunks that one man could lift, and brought them this way 140 miles to the work. By cutting a fresh channel across the ox-bow just above the new dam, it was possible to throw the river into this new bed and thence back to its old channel below. Since this feat was performed in broad daylight, and worked, the Shantung Yellow River Bureau has itself purchased a pile driver and used it to advantage in building rock piers out into unruly stretches of this same stream.

Just as our work in America on the Mississippi River has developed through years of experimenting, so China's work on river control must go on. But while the American Congress voted last year $400,000,000 in gold for one river program, China has not yet felt able to put as much as one per cent. of that amount into any one piece of river improvement at any one time. Neither has she put adequate study by high-grade river engineers into the problems she must face, if she is to free herself of the burden of flood losses.

China should begin now to insure generously against floods. If she does, then, perhaps, twenty-five years hence a good beginning will have been made, and a school of first-rate river engineers will be growing up who will command the respect of their fellows in other lands, by the accomplishment of satisfactory results through scientific experimentation.

New Roads in China

By TANG YU-LOO

Good Roads in China are distinctly a new phase—a tendency in the direction of the motor car civilization. The Good Roads Movement was started as recently as 1920 as a Committee of the Pan-Pacific Association of which Mr. C. T. Wang was chairman and George E. Sokolsky, secretary. Subsequently, the Sino-Foreign Committee was dissolved and a separate Chinese organization, the Good Roads Association of China, was founded. This body conducted a nation-wide propaganda in favor of good roads, which attracted considerable attention and achieved specific results which Mr. Tang describes in his article.—Ed.

On May 23, 1929, The National Highway Planning Commission concluded a three months' conference in Nanking under the auspices of the Ministry of Railway. The Commission considered every phase of the major problems of Highway Planning. National Highways were divided into two classes, namely; the China Proper Lines and Frontier Defence Lines. The latter were selected solely from the viewpoint of National Defence, while the selection of the former was designed to connect the different provincial capitals with Nanking. Guided by this principle, twelve lines were proposed for projection. They are: Nanking-Kwangsi, Nanking-Yunnan-Sikang Line, Nanking-Thibet Line, Fukien-Sinkiang Line, Nanking-Mongolia Line, Nanking-Heilungkiang Line, Kalgan-Suiyuan Line, Kansu-Thibet-Sinkiang Line, Suiyuan-Sinkiang Line, Heilungkiang-Mongolia Line, Tihwa-Sula Line and Shensi-Kwangsi Line.

In the proposed construction program, the projected lines were divided into four Groups as follows:

The Construction Program

In the proposed construction program, the projected lines were divided into four groups as follows:

GROUP 1—Nanking-Kwangsi Line
  Nanking-Tali Section, Nanking-Yunnan-Sikang Line
  Yunyang-Chengtu Section, Nanking-Thibet Line
  Wuchang-Lanchow Section, Sukien-Sinkiang Line
  Paotou-Sining Section, Suiyuan-Sinkiang Line
GROUP 2—Tali-Tenchung Section, Nanking-Yunnan-Sikang Line
  Luchow-Siangyang and Shasi-Chengtu Sections, Nanking-Thibet Line
  Foochow-Wuchang and Lanchow-Tihwa Sections, Fukien-Sinkiang Line
  Nanking-Mongolia Line and Pangkiang-Kalgan Branch
  Shensi-Kwangsi Line
GROUP 3—Tali-Patang and Kunming-Cheli Sections, Nanking-Yunnan-Sikang Line
  Chengtu-Lhasa Section, Nanking-Thibet Line
  Tihwa-Ili Section, Fukien-Sinkiang Line
  Kalgan-Suiyuan Line
GROUP 4—Kansu-Thibet-Sinkiang Line
  Sining-Sula Section, Suiyuan-Sinkiang Line
  Heilungkiang-Mongolia-Sinkiang Line
  Tihwa-Sula Line

The Lines in the first two groups constitute the China Proper Lines, while the remainder, the Frontier Defence Lines. As the establishment of communication is all important, it is proposed that earth roads are to be built first to be turned into macadamized roads afterwards. Macadamizing is to be done as soon as funds are available, since, as we all know, earth roads are rather expensive in the cost of maintenance. While the completion of the whole system of national highways requires hundreds of millions of dollars. It is gratifying to know from the preliminary estimates made at the conference that the China Proper Lines can be completed with earth roads for approximately seventy million dollars. Thanks to the recent highway construction movement initiated in the different provinces, a substantial portion of the China Proper Lines has already been opened to traffic.

According to the last report of the National Good Roads Association, China to day has 62,898 *li* of roads capable of bearing motor car traffic. The following is a list showing in total the number of modern roads together with their total length in the various provinces of the country:*

Name of Province	Number of Roads	Total lis	Name of Province	Number of Roads	Total lis
Kiangsu	54	3,109	Kiangsi	7	935
Chekiang	22	1,676	Hopei	31	5,226
Hupeh	11	2,423	Kansu	8	5,360
Hunan	10	872	Jehol	3	2,200
Shantung	14	4,605	Charhar	4	4,686
Shansi	10	3,920	Yunnan	1	700
Kwangtung	180	7,321	Suiyuan	1	1,485
Kwangsi	25	4,007	Sikang	2	999
Fukien	34	1,007	Shensi	2	320
Honan	36	2,060	Liaoning	3	1,030
Szechuen	18	2,205	Kirin	3	322
Kweichow	8	2,670	Mongolia	1	750
Anhwei	16	3,031			
			Total	504	62,898

It should be noted that the foregoing figures are by no means comprehensive. They do not include those roads under construction at the time when the above statistics weie compiled in May 1929. They do not include municipal roads.

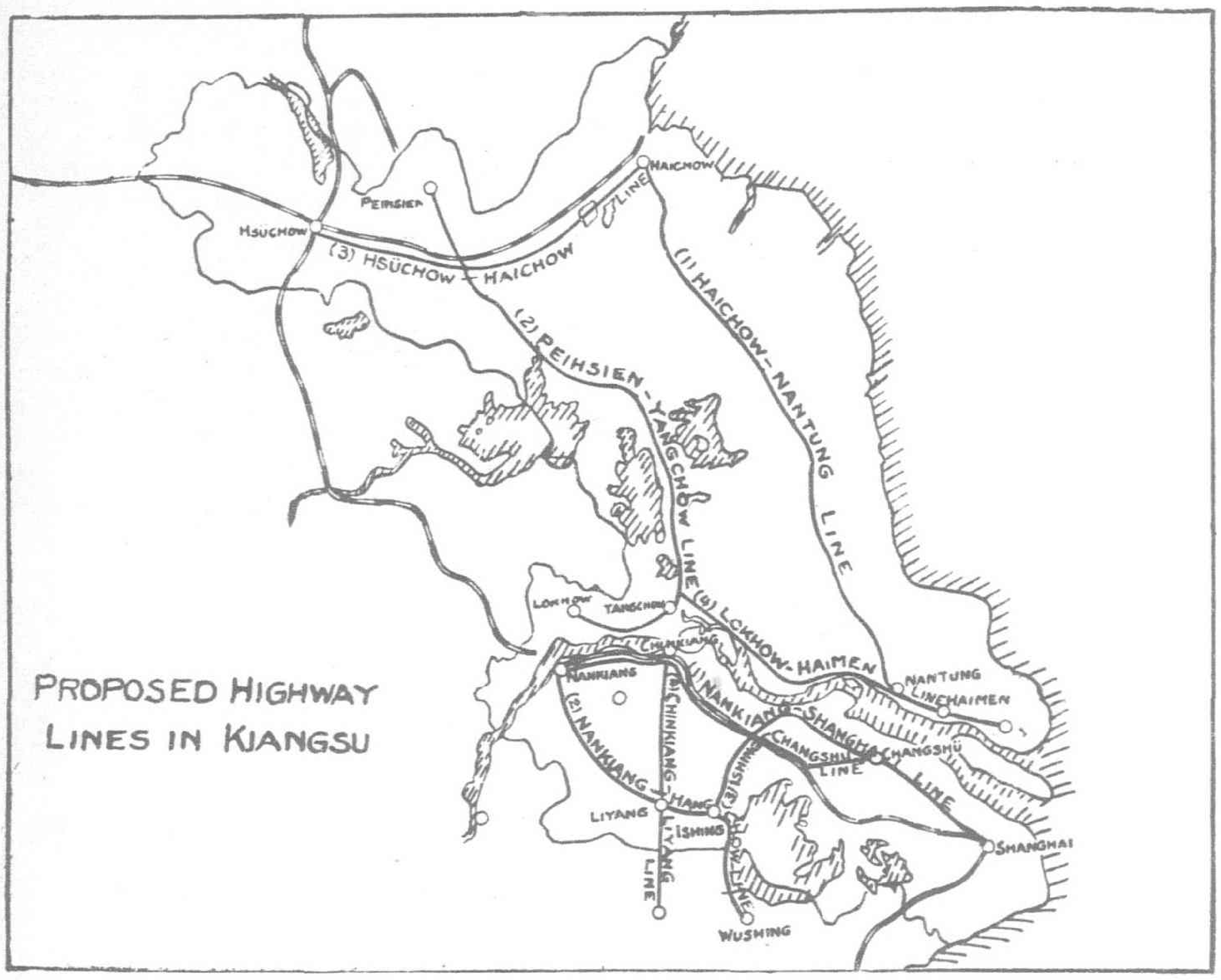
Kwangtung with 180 roads of a total length of 7,321 *li* is easily the leading province in highway construction. Its neighboring province, Kwangsi, which had practically no modern road two years ago, now possesses 25 highways of a total length of 4,007 *li*, ranked fifth among the provinces in mileage. Considering the late start, Kwangsi's record is a very enviable one. Yunnan has now only one highway of 700 *li*, but the construction of a 25-mile road in the Southeastern part of the Province to connect the tin mining and smelting center of Kochiu with the treaty port of Mengtsz and with Pishichai is being contemplated by the Yunnan-Kochiu Tin Trading Co. By the end of this year, the first section of the road, about 10 miles in length will have been completed, the only part of the route presenting serious engineering difficulties.

The Northern and Northwestern provinces have not been lagging behind in their highways-building program, in spite of war and famine. Kansu, Chahar, Hopei and Shantung have an aggregate length of 20,077 *li*, almost one-third of the total length of the country. In Kansu, more than 5,000 *li* of highways are already in use. The roads radiate from Lanchow, the provincial capital, making this heretofore inaccessible city, the trade center of China's Northwest. Hopei (Chihli) has 31 highways with a length of 5,226 *li*; Charhar has 4 highways with a length of 4,686 *li* and Shantung has 14 highways with a length of 4,605 *li*. The Northern periphery of China Proper, extending from the coast to Chinese Turkestan, is therefore well supplied with highways in comparison with the other sections of the country, but this has been so historically because the Yellow River bends Southeastward at the border of Shansi and Shensi, leaving the region north of the river ill-supplied with waterways.

It is for the same reason that Kiangsu and Chekiang, while otherwise the most progressive provinces in China, have comparatively fewer highways, as the "net works" of waterways spreading over southern Kiangsu and northern Chekiang supply already the necessary means of communication. It is not until Nanking was made the national capital that highway building in these two provinces received its deserved attention.

The Kiangsu Highway Commission, organized under the auspices of the Bureau of Reconstruction of the Kiangsu Provincial Government made the survey of the province for highway projection late last year. This survey called for building 11,000 *li* of highways and 20,000 *li* of tributary roads in the province which (figuring at $6,000 a *li*) will require the enormous sum of $180,000,000.

**The Good Road Monthly*, June 15, 1929.



In outline, the Kiangsu Highway will have two principal lines, namely, the Kiangpeh line and the Kiangnan Line. The Kiangpeh line will contain four sub-lines (1) Haichow-Nantung Line. (2) Peihsien-Yangchow Line. (3) Hsuchow-Haichow Line. (4) Lohhow-Haimen Line. The Haichow-Nantung line runs parallel with the coast from Haichow to the principal industrial city of northern Kiangsu, Nantung, on the bank of the widest sector of the Yangtze River. The Peihsien-Yangchow line runs parallel with the border of Kiangsu and Anhwei, from Peihsien, touching the Kiangsu-Shantung border to Yangchow. The Hsuchow-Haichow line is parallel with the section of Lunghai Railway from Hsuchow to Haichow, intersecting the Peihsien-Yangchow line at Yaowan and meeting the Haichow-Nantung line at Haichow. The Lohhow-Haimen Line runs parallel with the Yangtze River, meeting the Peihsien-Yangchow line at Yangchow and the Haichow Nantung line at Nantung.

The Kiangnan line will also contain four sub-lines (1) The Nanking-Shanghai Line (2) The Nanking-Hangchow Line (3) I-Shin-Changshu Line (4) Chinkiang-Li-yang Line. The Nanking-Shanghai line runs with the Shanghai-Nanking Railway to Changchow, thence it goes northward to Kiangyin, turning southward again to Changhsu and reaching Shanghai *via* Kiating and Nanziang. The Nanking-Hangchow line is a part of the National Highway. The section in Kiangsu which was recently completed, was built by the Reconstruction Bureau of Kiangsu, starting from Nanking, turning South-eastward to I-Shing through Li-Yang, where it meets with the I-shing-Changchow line. From I-Shing it turns sharply southward into Chekiang through Changhsin. The I-Shing-Changshu line runs northward from I-Shing to Changchow, turns southeastward to Wusih then goes straight eastward to Changshu. The Chinkiang-Li Yang line starts from Chinkiang and goes straight southward to Liyang, where it enters Anhwei *via* Kwangteh.

Chekiang had her highways surveyed as early as the spring of 1928. There are to be ten highway-lines. Those that start from Hangchow are:

1. *Hangchow-Ningpo line,* running from Hangchow eastward to Ningpo through Shaohsin and Yuyao with a length of 397 *li*.

2. *Hangchow-Kin-Yu line,* starting from Hangchow, turning southward at Siaoshan to Kinhwa, whence to Lisui and Yunwu, traversing a distance of 915 *li*.

3. *Hangchow-Kiangshan line,* starting from Hangchow, going westward to Fuyang, Juian and Kaihwa, where it turns southeastward to Kiangshan with a length of 805 *li*.

4. *Hangchow-Changhwa line,* starting from Hangchow going westward to Changhwa, where it enters Anhwei by Yao-Ling-Kwan.

5. *Hangchow-Kai-Pu-Chin line,* starting from Hangchow running northward to Huchow and Hsianhsin with a length of 276 *li*.

6. *Hangchow-Chapoo line,* starting from Hangchow running northeastward to Chapoo through Hsining and Haiyen with a length of 226 *li*.

The following four lines do not start from or touch Hangchow:

7. *Pinghu-Hsianhsin line,* starting from Pinghu going northwestward to Hsianhsin with a length of 377 *li*.

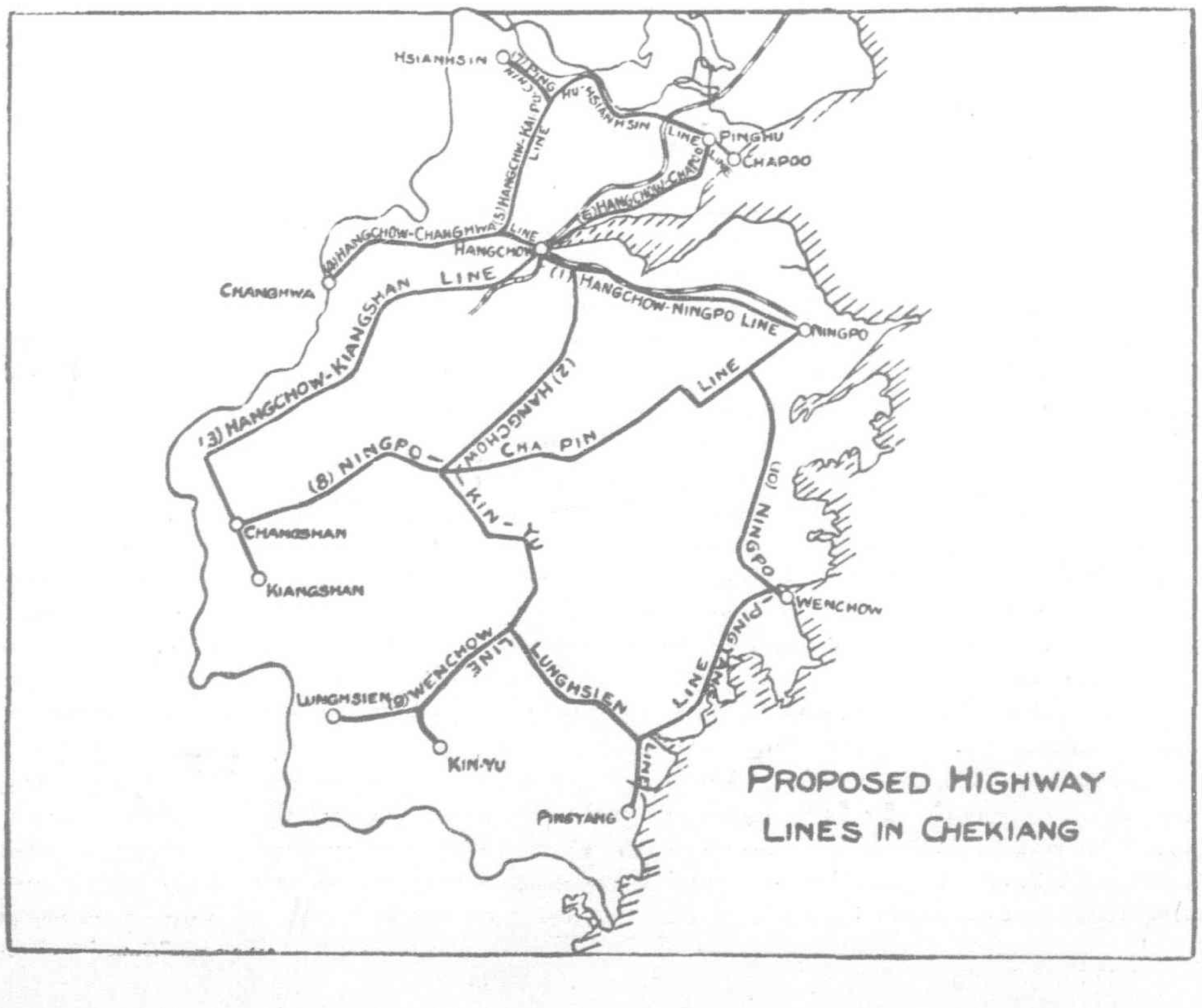
8. *Ningpo-Chaopin line,* starting from Ningpo, going southwestward to Fenghwa, Hsinhsien and Kinhwa, where it turns northwestward to Lanchi, then turning southwestward again to Changshan touching the Hangchow-Kiangshan line, traversing a distance of 525 *li*.

9. *Wenchow-Lunghsien line,* starting from Wenchow, going northwestward Li Sui, where it turns southwestward to Yunhwo and Lunghsien, traversing a distance of 525 *li*.

10. *Ningpo-Pingyang line,* starting fron Ningpo, running parallel to the coast entering Fukien at Pingyang with a length of 900 *li*.

In addition to the ten main lines described above, the survey called for the construction of another 38 tributary roads, amounting to a total length of 6,673 *li*. In total, Chekiang will have 11,545 *li* of highway, when all completed.

The Chekiang portion of the Nanking-Hangchow highway was completed on September 29 and the Kiangsu portion was completed on October 25. The highways run from Nanking to Hangchow, through Tangshan, Kuyung, Li-Yang and I-Shing, with a length of 278 *li*. The construction was started in January and was completed in less than 10 months. The highway cuts through many hills, so that as many as 1,800,000 cubes of earth were excavated during its construction. It has 70 bridges, ranging from 300 to 30 feet in length. The total length of the bridges is 6,000 feet and they are able to bear an average weight of 12 tons.



Economics of Highways for China

The following article by MAJOR O. J. TODD is part of a series issued by the Ministry of Railways

THE food problem of China has made the question of transportation a most vital one. Back from the coast, water transport handles but a small part of China's freight. Carrying burdens on the backs of men and animals over rough and steep trails has been done for centuries; but the competition with other nations in the struggle for existence reminds the Chinese that they must cease paying from 40 cents to $1.00 per ton-mile for thousands of tons of their products brought in from farms and mines to the main arteries of commerce. They must have both railways and highways. In America there are ten times as many miles of highways as there are of railways. China must acquire a similar network of roads, if she is to prosper.

In deciding upon a nations's highways, investigation is first made as to present facilities that can be improved at low cost. Unfortunately, there is little here on which to work, except the hills and plains as they were made by nature. There are few man-made roads in this great nation to rank with the average roads of Europe or America. So, on the start, the ground is practically clear.

Roads must connect important centers of population and bring back-lying districts into communication with navigable rivers and trunk-railway lines. Main lines should be so located that they will have fairly heavy traffic within the first five years of their lives. Otherwise, the investment in rights-of-way and construction will not be warranted. This problem of locating the first main lines requires the greatest of care. In some cases a number of the most desirable lines must be built slowly, due to their cost. Where the country is not too rough, there is usually local labor sufficient to put through the grading without making any great tax on the future.

China has not such concentrated traffic that can pay large maintenance traffic taxes as in the United States. Only in well settled regions where industries call for large payrolls and where speed in traffic is essential, can well surfaced roads be paid for as quickly as in America—by means of traffic taxes. Having not yet developed these industries on a large scale, China cannot expect large auto revenues, even on roads in the outskirts of Shanghai, or on a road connecting that city with Wusih to the north—a growing manufacturing center.

At the start China must pay at a slower rate in dollars, and, therefore, must begin with less elaborate roads. She has not the credit to warrant her making huge loans for road construction. That credit must be built up gradually. She does, however, have man power that can be taxed to build these arteries of travel. This man power will pay its tax in muscular exertion for the most part. It is one of China's greatest resources.

That this force can be mobilized and used for the extension of China's highway system has already been proved in a number of cases where strong provincial leaders have been in charge and have taken the pains to acquaint the people with the benefits to be derived from a proper system of highways. To mention but two instances—Kwangsi and Kweichow Provinces—we bring to mind the extraordinary building programs carried out in these distant and extremely poor regions during the past two years. No money came in from the outside, yet Kweichow mustered a road army of 200,000 men and women and worked all winter (1927-1928) grading 600 miles of standard highway through some of China's roughest terrain. Again, this year, in Honan, Shensi, and Kansu, road building has gone forward, urged by the political heads in charge. There was not much competent supervision to this work; but the man power was there ready to do it.

Man power without proper direction is an unwieldy force, often wasting itself and getting only partially successful results. China has been weak in staff for this work, and to-day has very few men who are trained to take charge of a broad road-building program. Personnel will have to be developed as this work progresses, but there should be provided a strong nucleus-staff training at the same time it supervises laying out and constructing these lines.

In the Great Plain of China, comprising much of Hopei (Chihli), Shantung, Honan and Kiangsu Provinces, the problem of grades is of small moment. The country, as a rule, is nearly level. Earth roads are built up from one to two feet above the terrain, and, for the dry season, stand up well under medium loads carried in autos. In much of this plain, the rock supplies are far away, so that earth roads are the most practicable for the present. When drained properly, these earth roads can be used most of the year.

In connection with these earth roads of North China, there is always the difficulty of policing them, so as to ensure that the destructive narrow-tired Peking cart, and the luggage cart shall keep off the roads that are to be used by autos. These two-wheeled carts are loaded by their owners to their full capacity—usually a ton in good weather. An earth auto-road can be kept in condition only with the greatest difficulty when used by these carts.

Drainage by side ditches and sufficient culverts and off-takes has been sadly neglected throughout the regions where roads exist. If one had had occasion to take a trip out of Peping to the Western Hills during the first week in August of this past summer, he would have noted the damage caused by the total lack of any adequate system of road drainage. Heavy rainfalls came and either used the roads as water courses or dashed across the top, where there should have been properly prepared waterways. The matter of road drainage is of importance even in the plains of Shantung, but as yet this fact has not been recognized. The farmers dig ditches across the earth motor-roads and let the water pass across to a neighbor, then generally neglect to fill up the said ditches.

In Shansi Province some good up-keep work has been done on the new motor-roads constructed there during the past eight years. In that province the highways are kept crowned, fairly well drained, and so policed that carts do not use them. These roads are chiefly for official and military purposes, though they accommodate regular bus lines for general passenger service.

While the loess soil of North-China drains well and dries quickly after rains, the red clay belt of Central and South China is quite different. There, earth roads are not usable more than 60 per cent. of the year. They must be graveled or macadamized, which makes them much more expensive.

In the mountainous regions of west China, limestone rock is convenient for macadamizing. Here very few plain earth-roads will be built, because of the sticky nature of the clay in the valleys. Sand is not convenient to mix with it, so as to make sand-clay roads. Here the price of macadamizing must be paid. There is available local man-power to do it; and eventually it will be done.

Since China is now interested in building roads to provide chiefly for automobile traffic, they should be so planned that they can be improved. Therefore the grades must be established on a lasting basis. A maximum of 7 per cent. can be maintained in building most of the main highways. The 20 per cent. to 25 per cent. grades that exist in a stretch of an auto road built from Sian to Lanchow this year will be eliminated as soon as engineers instead of soldiers and local officials are put in charge of this work.

For China's present needs a road thirty feet wide is satisfactory for her trunk lines. If this be built on good alignment and with moderate grades, it will handle the auto, ricsha and bicycle traffic of most regions for many years to come. Near the large port cities, wider roads must be constructed much sooner. The metalled surface of these inter-provincial highways should be from fourteen to twenty feet wide during the first few years of its life. As the roads pay, funds can be collected to improve and widen the metalling.

It now seems wise to recommend that in the Great Plain of China, where lœss soil predominates, earth roads be constructed, well tamped by hand in six-inch layers, and well crowned so as quickly to drain the surface. If kept exclusively for autos and other rubber tired traffic, they will serve passenger needs for a number of years. These roads will be the cheapest that can be built for auto service, and the cost will average about $2,000.00 per mile, exclusive of special side-drainage that may be necessary in badly drained areas. These roads can be maintained by hand, using from two to three men per mile the year around. Sandy places will be repaired by a six-inch coat of clay or lime-containing soil, tamped tightly into place where traffic develops these loose spots. Brick and stone culverts and wooden bridges will be used, as a rule. Stone "dips" will be placed as fords over foot-hill streams that are dry much of the year, but develop large freshet-flows lasting only a few hours.

The earth roads of North China should be converted to macadam roads in such places as growing auto-traffic demands and earnings will permit. For the first few years, only the busiest roads will be able to stand this cost, except where they are very close to a rock supply, for cart haul in China is expensive. In road work the cost of animal labor as compared with man labor is much greater than it is in America.

South of the Yangtze, even in level regions, such as are found near Nanchang and Changsha, earth roads get slippery too readily after showers. They require a coat of six or eight inches of gravel, such as is now being placed on the new highway just south of Nanchang. The engineers who laid out so many fine roads in Kwangsi two and three years ago soon learned that the red-clay soil required either gravel or coarse sand mixed with it for the upper six inches—at least if the roads were to be used in any but fair weather.

Macadam surfacing should be placed on all South China roads where gravel is not available. As previously stated, limestone rock is convenient in much of West China. Along the roads of Kweichow the haul is light. Except on the large plain around the provincial capital, Yunnan has ample rock close at hand for macadamizing purposes.

Macadamized roads will rapidly follow plain earth roads in China, as they have in America, but earth roads will probably remain as the standard type much longer, for the reason that China will not be able to take the next step, which is to concrete the road surface, without a very great increase in her present borrowing capacity. For rapid traffic, concrete roads are much to be preferred. However, they would be a luxury for China to-day, except in and near large cities. Cement plants are not well distributed around China. Aside from the small one at Tayeh above Kiukiang on the Yangtze, the others are close to the coast. Prices of cement taken far inland are prohibitive for road building. Cement plants must be erected in Szechuen, Yunnan and Kweichow before the matter of concrete roads can be seriously considered for West China.

Thus far China has used but little road-building machinery, as it is known to the West, if the street work in her treaty ports is excepted. She has worked with the shovel and carrying basket as a rule. In regions back from the plains, picks, iron hoes, and wedges have been employed for rock work. A small amount of blasting has been done (mostly by use of native black powder) in company with hand drilling. Rock is broken up for macadam by hand, the beggars of a town often being employed for this service. Stone crushers for interior China have not yet been found economical. Neither has the modern road-roller. It is too expensive an article to transport to the place of construction. How, for example, can even a five-ton road-roller be taken across any of the rivers above Nanchang? Ferries for wheelbarrows and passengers exist, but none for rollers. Tractors with trailers may soon come into use, along with light road-rollers near large navigable streams and railways. Road-graders may follow for up-keep work where earth roads are concerned, though as yet hand maintenance is considered more economical.

Gradually increasing wages will bring this Western machinery more and more into the work of road construction. At present there seems little place for it, partly from lack of ready cash to pay for such equipment. It will come in on a rapidly increasing scale when a broad highway-program is inaugurated. In that day, even the pneumatic drill will not be out of place in mountainous regions.

What a vast work lies before China's engineers in preparing for this great country an adequate network of highways : Only 20,000 miles of road fit for auto traffic during a considerable part of the year now exist in the Republic. This mileage should be duplicated every year, yet no arrangements have been made whereby it can be done next year or the year after. Should China undertake such an ambitious program, it would require 150 years to catch up with the highway mileage of the United States as it exists to-day.

It has been recently proposed that a National Highway Bureau be given $10,000,000.00 a year from the national revenues to be used as a National Road aid in working with the provinces on a $40,000,000.00 per year program of trunk-line highway construction. The National Bureau would employ all engineering skill, but all equipment, operate a training school in the field for men who are to become the road builders of to-morrow, establish a thoroughly organized Bureau that would handle demobilized troops on road construction, make all surveys and plans, and contribute toward the building of suitable bridges. The provinces, on their part, would furnish the common labor in value up to three times that of the National Aid given through staff work, bridges, etc. In this way, perhaps, 5,000 miles of good trunk-line roads would be built each year. This policy would act as a stimulus to the provinces encouraging them to build branch lines through their own Provincial Road Bureaus.

The above proposal has not yet been favorably acted upon by the National Government, though it has had the strong support of the Minister of Railways ; but it may be adopted next summer. It contemplates an expenditure of 7 per cent. of what the United States is now giving as National Road aid, and but 0.3 per cent. of the amount that is being spent in that country this year on highway construction by the national, state, and county organizations combined. This seems a pitifully small amount to put into such an important undertaking. However, the Chinese National Government is not yet prepared to take this step. For the present, roads must continue to be built by the provinces without any directing force of great moment being put behind the program from the national capital. The provinces will continue, however, to work along as heretofore, but without much high-class engineering direction.

It is hoped that, after army demobilization has become an accomplished fact, an adequate budget, prepared by engineers, will be voted to launch this work as it should be handled. Not until that day arrives will a genuine Good Roads Movement be inaugurated in China. Good highways cannot be built without a first-class staff. It is just as necessary that well-trained, dependable, adequately-paid experts be in charge of this work as it is for graduate doctors of standing to be in charge of our hospitals and other medical service. These men of the medical profession have had much assistance from various sources in getting their work organized. Probably the work of the engineer will not appeal to the altruist so strongly, though it is quite as necessary. Eventually the National and Provincial Governments must face the fact that this skill must be employed and paid for at rater current within the profession.

"How to Build Highways in China" cannot be learned from textbooks. Local conditions vary so much that no standard practice has yet been established that will cover most of the cases arising in various sections of the country. What China needs is resourceful engineers of experience and exceptional ability, to take the lead in any highway program that is to be at all comprehensive. Under them will grow up, through the years, a personnel worthy of this great task that must be accomplished in a workmanlike manner before China can claim the place among nations that her area, natural resources, and population entitle her to expect.

Shinanogawa Stations to be Completed

The construction of the Shinanogawa Electric Power Stations by the Ministry of Railways has been decided on as the result of frequent conferences among high officials of the institution. The Minister of Railways, Dr. Tasuku Egi, has given his sanction to this undertaking. Work will be started early next fiscal year. On the completion of this gigantic enterprise in 1937, the Ministry is expected to get 170,000 kilowatts of power from these stations. This will contribute largely to railway electrification.

According to the original plan, an appropriation of Y.58,545,000 is set aside for the work. Of this, Y.2,600,000 is for the fiscal year of 1930, Y.4,000,000 for 1931, Y.9,200,000 for 1932, Y.12,100,000 for 1933, Y.19,997,000 for 1934, Y.5,500,000 for 1935, Y.7,000,000 for 1936 and Y.4,148,000 for 1937.

The reason why the Ministry has decided to take up the work, despite the fact that it has substantially cut the railway construction expenses, is in that railway electrification is the most important thing for future railway improvement. All other countries are trying to electrify their railways. The supply of cheap power is necessary under the circumstances, it is argued.

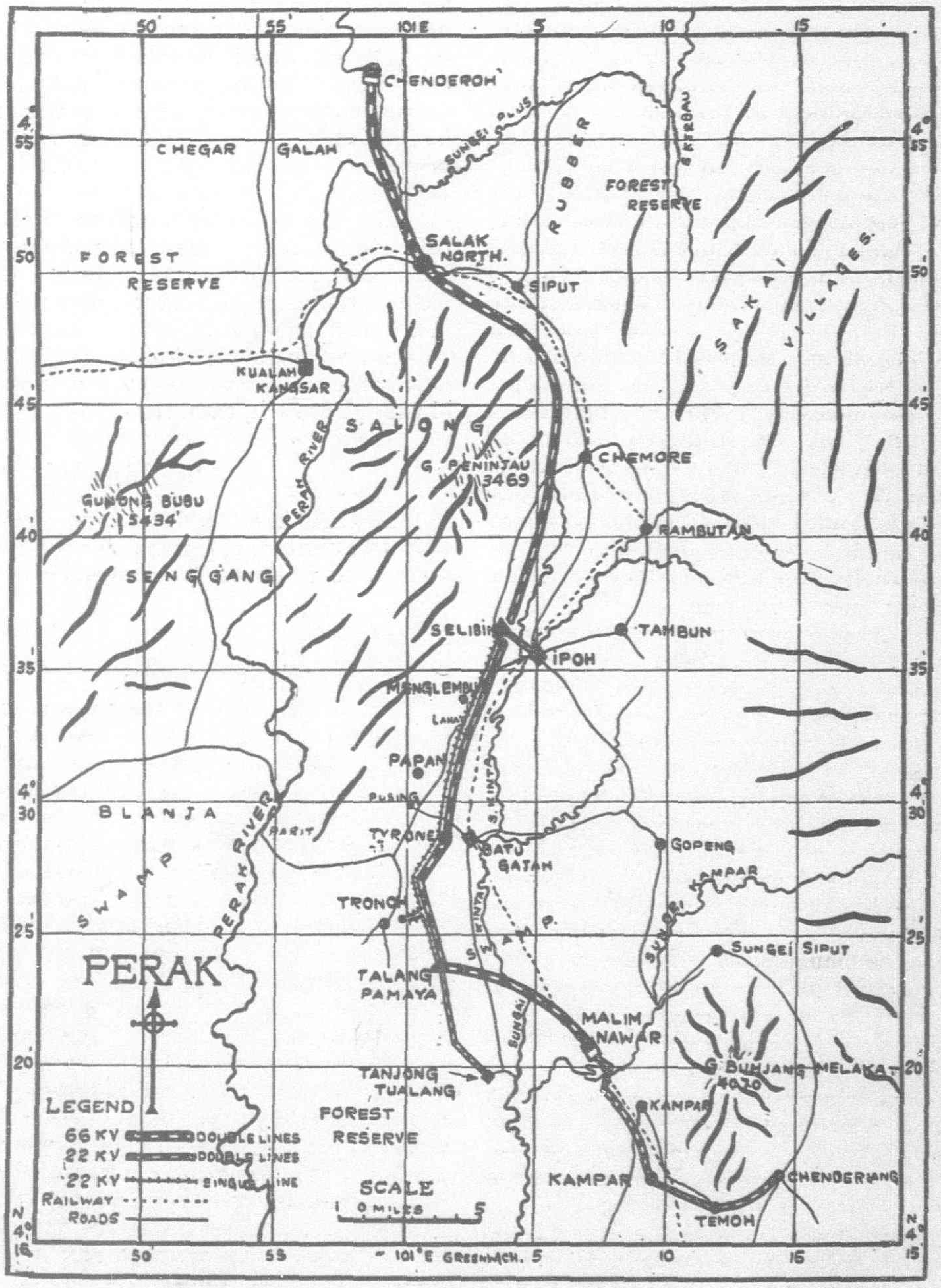
The Ministry estimates the power charge per kilowatt will be 1.5 sen or so. This means a gain of 8 rin or 35 per cent. over the present rate the Ministry is paying. The Ministry wants Y.10,000,000 of power in 1937 but it will have to pay only Y.6,500,000.

Electrical Developments in the F.M.S.

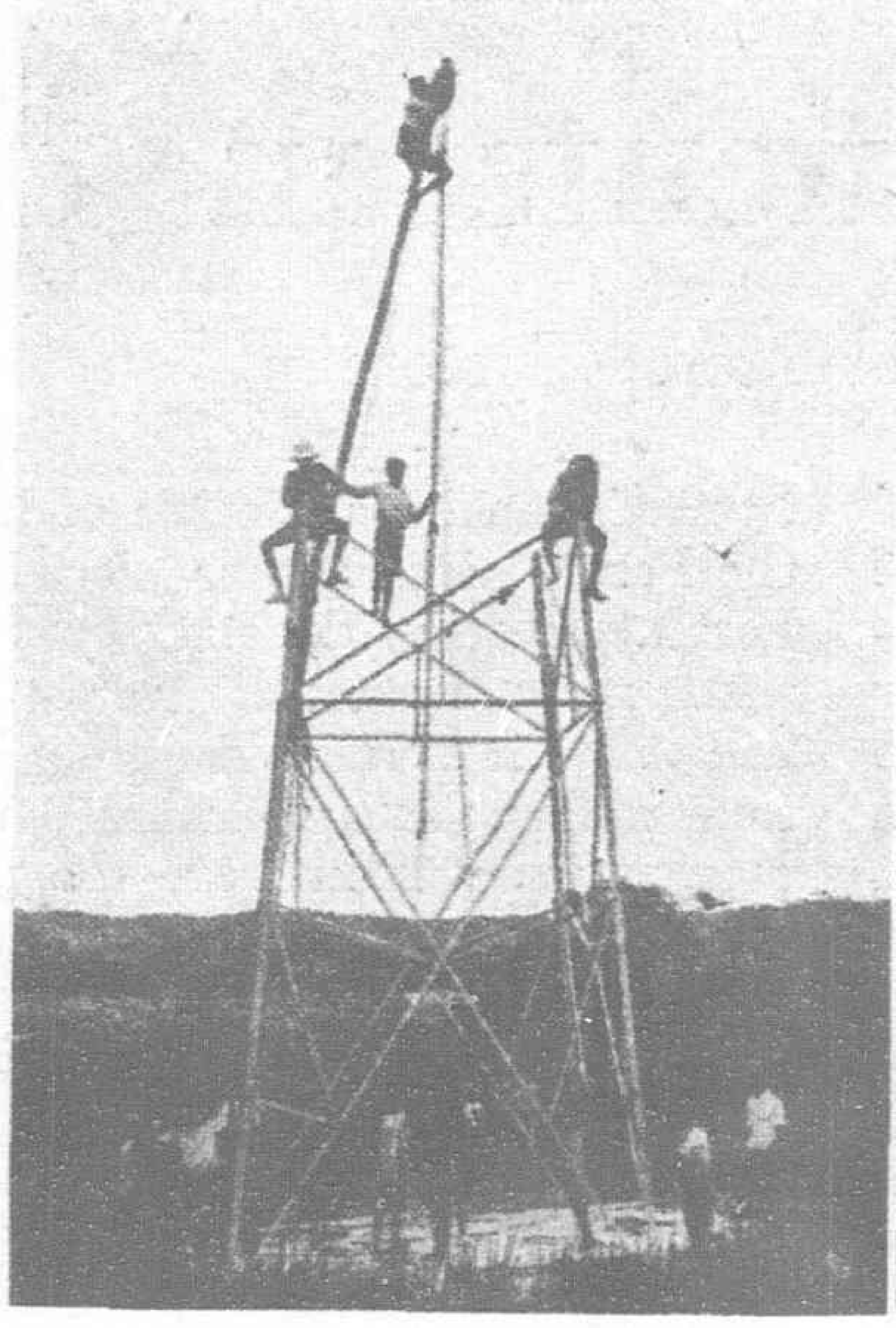
Proposed Super-Power System

Reviewing the annual report of the F.M.S. Electrical Department the *Malayan Tin and Rubber Journal* says that the year 1928 was one of remarkable development in the generation and application of electricity in that part of the Far East. Malaya is at present awakening to the immense possibilities and advantages of electric power in industry and in the sphere of domestic use. It is of vital importance, therefore, to the future prosperity of the country that this development proceeds on proper lines, which will enable further extensions to be carried out with the maximum efficiency and at the least possible cost. The report points out that the experience of older countries in this respect has not been too fortunate, with the result that to-day vast amounts of money have to be expended in rectifying mistakes which could have been obviated had a national policy of development been anticipated and carried into effect earlier. The Malay States has the opportunity of benefiting by the mistakes of others and it, therefore, becomes necessary to decide upon a national policy with regard to the generation and distribution of electricity throughout the country. In the past, small isolated plants have been installed to meet the requirements of individual factories or mines, and no attention has been paid to a general scheme of supply. It is not too much to say perhaps, that the development of the country has been entirely left to the efforts of individuals whose interests can hardly be said to be national. The demand for motive power to prepare the products of the country for the world's markets has increased tremendously in the last few years and each case, hitherto has been considered individually without any reference to a general scheme. The time has arrived, therefore, when this country must be prepared to invest in heavy capital expenditure to carry out a governmental scheme of electrification which will ultimately stretch from north to south, with power stations situated along the route and efficiently inter-connected.

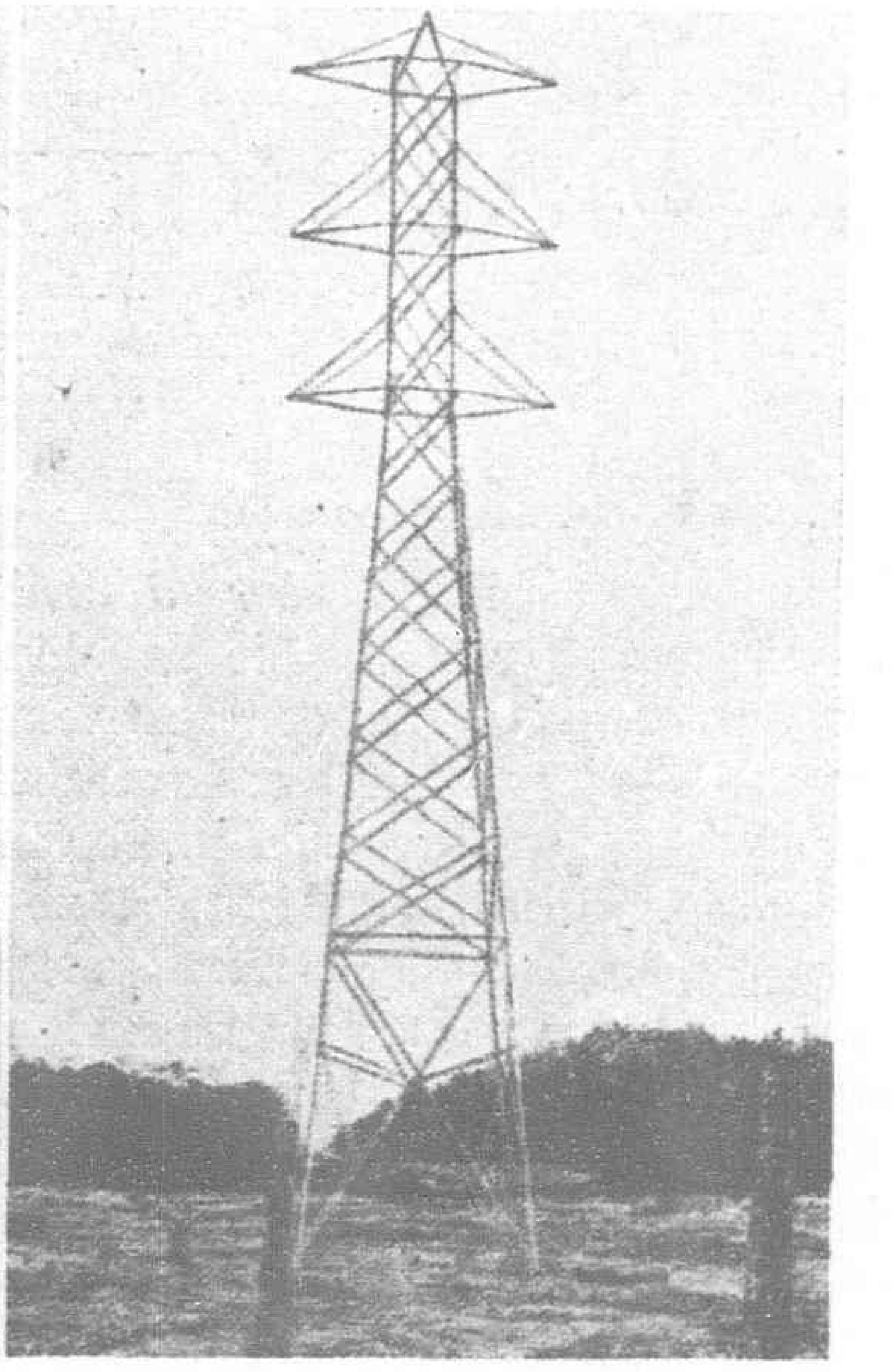
In the Federated Malay States, it is expected that at no distant date the activities of the Government electrical undertakings in Negri Sembilan and Selangor will have made it possible to bring into operation transmission lines capable of being linked together with those of the Perak River Hydro-Electric Power Company in the State of Perak. Further developments from the Prai power station of the Penang Municipality towards the borders of Province Wellesley will make it possible to complete the scheme. Although it may take a few years to achieve this object, it is necessary at the present time to indicate the ultimate goal at which to aim. A great deal has already been done towards the realization of these plans. During the year under review, plans have been prepared for many small townships and some have already been put into operation. The system of supply has been standardized for three-phase a.c. working at a frequency of 500 cycles, which will be suitable for connecting up to a supply from main transmission lines at high voltage as the scheme develops. The country is capable of producing an abundance of coal which is suitable for the production of electrical energy and which is already giving highly satisfactory results. The electricity supply developed rapidly in all branches during 1928. Every section of the department was working to its fullest extent to meet the demands, and the measure of success attained can be judged by the very large increase of units sold to all classes of consumers. Comparing the months of January, 1928, and December, 1928, the units delivered from the Bungsar Power Station to feeders increased by 139 per cent., and the works cost per unit was decreased by 34 per cent. The machinery has maintained a high standard of efficiency, and no breakdowns other than of a minor nature have occurred. The maximum load carried was 3.800 kW., as compared with 1.0950 kW. in 1927, and the load factor, calculated on units sent to feeders, was 55.3 per cent. in December, 1928, as compared with 42.3 per cent. in January, 1928. A very large increase in the connection of mining load is recorded. Eleven new sub-stations were erected, equipped with transformers, and switchgear, and connected by high tension lines run from the main transmission lines. In addition, a new 33,000-11,000 volt outdoor sub-station of 2,000 kVA. capacity was erected in the Central Workshops area of the F.M.S. Railways. The 33,000 volt line to Kepong was extended a distance of 2¾ miles, to Sione and Batu Caves



Perak Hydro-Electric Power System



66 kV. Straight-line Pole During Erection



Completed 66 kV. Tower

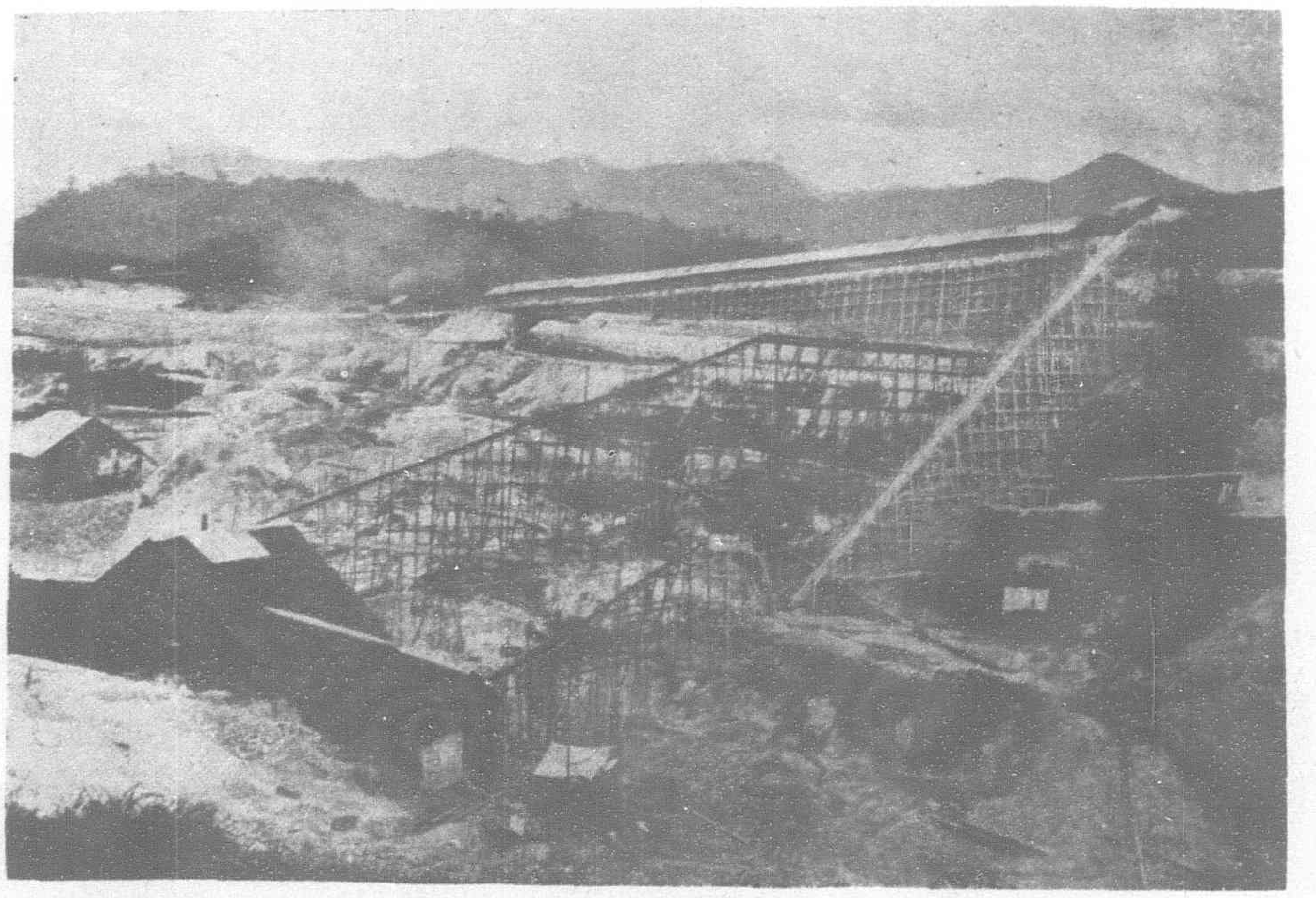
Tin Dredging Company's areas. A 33,000 volt line was run from the ring main Sungei Besi Road to Serdang, a distance of 7 miles, and other lines were connected from this to the Tet Lee Mine, ¼ mile; Weng Loong Mine, 1 mile; and the Hock Hin Mine, ¼ mile. Eleven thousand volt lines to the Kat Loong, Goh Thean Sang, Chop Heap Loong Mines, which are situated in the Pudu Llu area, were erected and commissioned.

The extensions recorded in connection with low tension overhead mains far surpass all previous figures. At the end of 1928, the total length or run was 134.85 miles, 54.6 miles having been erected during the year, which was more than twice the length of run erected during the preceding year, 1927. The total number of consumers at the end of the year was 4,100, an increase of 1,102 compared with the increase of 959 during 1927. There are now motors aggregating 7,578.8 horse-power connected, which is an increase of 4,049.2 horse-power during the current year. New services, comprising 1,480 points consisting of lights, fans, cookers, geysers, etc., were installed departmentally; and in addition 1,191 points in Government quarters and buildings were re-wired. Contracts for the installation of electrical installations in 721 new Government quarters and buildings were entered into and completed by local wiring contractors to the standard specification.

The section for the issue of apparatus on hire-expanded very rapidly and at the end of the year no less than 698 domestic appliances were connected to the system. This has assisted considerably towards the great improvement in the day demand for energy, and is one reason why this section must be developed with increased vigor.

With regard to the Rawang supply the total number of consumers at the end of the year was 131 compared with 108 at the end of 1927. The undertaking supplies energy to every building in Rawang, with twelve exceptions, which is an instance of the appreciation by the general public of electricity supply when available at reasonable rates. The total number of units sold was 54,520, and the distributing system was maintained by the Electrical Department, Kuala Lumpur.

At Ipoh there are 1,971 lighting consumers, 99 power consumers and 28 street lighting circuits. Of these 204 were Government and 1,894 private consumers. There are now connected to the supply mains, 79 motors aggregating, 441 b.h.p., 18 cookers having a total rated loading of 68,700 watts, two water heaters totalling 6,200 watts loading and three electrolux refrigerators with a total rated loading of 1,080 watts.



Tin Mine at Temoh, Operated by Power from the Perak Hydro-Electric Co.

The Perak Hydro-Electric System

The most important electrical development in Malaya is the power distribution system of the Perak River Hydro-Electric Power Company. Rapid progress has been made in carrying through this scheme, which is intended to form the nucleus of the state-wide power system mentioned in the preceding article. A recent article in the *Straits Budget* describing the progress to date says:

The supply area of the Perak River Hydro-Electric Power Co. extends from the hydro-electric power station in course of construction at Chenderoh, some 15 miles north of Kuala Kangsar, to Bidor, in Batang Padang district, a straight line distance of roughly 60 miles. A steam power station is in operation at Malim Nawar, approximately 45 miles from Chenderoh.

In order to cover distances economically, it is necessary to transmit electrical energy at high voltages, and a standard voltage of 66,000 volts has been selected for the primary transmission system.

Energy at this voltage is transmitted to two main sub-stations one situated at Talang Pamaya and the other at Seliben, the last named out of Ipoh town.

The primary sub-stations are placed approximately at either end of the industrial area now supplied, and contain transforming apparatus together with the necessary switch gear for reducing the 66,000 volt supply to 22,000 volts, at which voltage electrical energy is taken to secondary sub-stations located in the centers of the mining load.

The secondary sub-stations receive current at 22,000 volts from the primary sub-stations, and contain transformers and switchgear for further reducing the voltage from 22,000 volts to 6,600 volts, the voltage at which current is supplied through feeders to the various mines.

A primary sub-station may also contain transformers for reducing the voltage to 6,600 volts for supply to mines in the vicinity of the sub-station, as in the case at Selibin.

Selibin Sub-Station

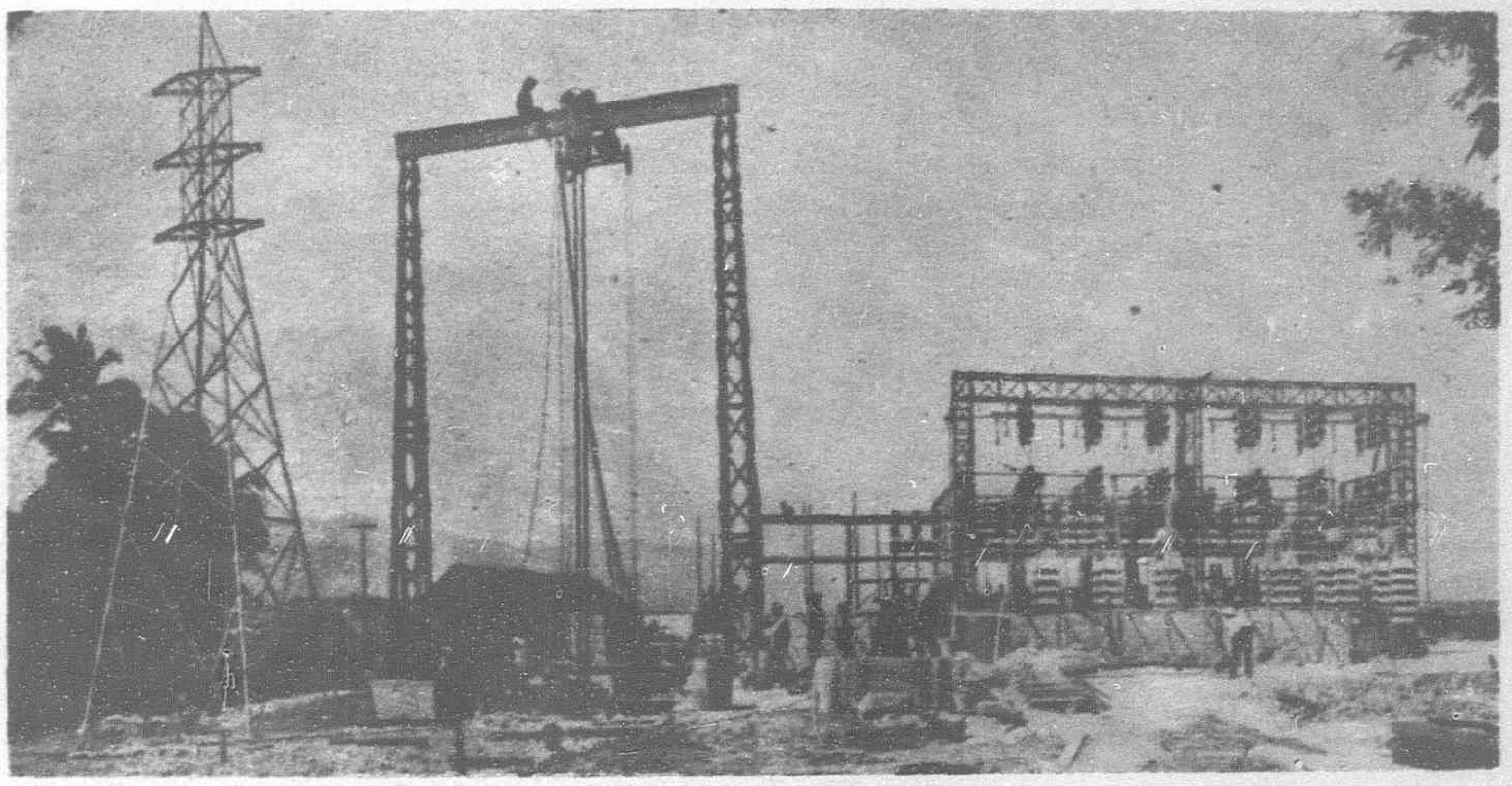
The Selibin sub-station will eventually be one of the most important distributing centers on the Perak River Hydro-Electric Co. system, as will readily be seen on consideration of the following points:—

(i) It forms a main switching point on the primary transmission lines (66,000 volts) which will join Chenderoh and Nalim Nawar power stations.

(ii) It will supply Ipoh town sub-station at 22,000 volts.

(iii) It is the northern extremity of the 22,000 volt loop line supplying the secondary sub-stations at Menglembu, Papan, Batu Gajah and Tronoh, towns in the Kinta District.

Two main banks of transformers are installed in this sub-station, each consisting of three single-phase, outdoor, self-cooled units, with a spare of each type. They are mesh-star connected, the first group having a capacity of 5,025 kV.A. at 63,000/6,600 volts, and the second group 3,000 kV.A. at 63,000/22,000 volts. Tappings with externally operated switches are provided, so that rapid voltage adjustment can be made. The tanks are provided with expansion vessels, and are designed to have a very large cooling surface. The neutral point of each transformer bank is connected to earth through a resistance, and, in the case of the 63,000/22,000 volt transformers, provision is made to instal a Petersen Reactance at a later date.



General View of the Selibin Station Nearing Completion

All 66,000 volt and 22,000 volt oil circuit breakers are arranged for remote control operation from the sub-station building, where desk type control panels with mimic bushars and indicating lamps are installed. The isolating switches are arranged for operation from ground level, and the usual arrangement is made for locking in a position to safeguard the operating staff. The 6,600 volt switch-gear is housed in waterproof sheet-steel cubicles having double doors, and an alarm bell is provided to warn the operator if a switch opens automatically.

Inverse time overload relays of the induction type are provided for the protection of all feeders and transformers, and in addition, duplicate feeders are protected by instantaneous differential phase current and earth leakage relays, and the transformers by Merz—Price circulating current protection.

Auxiliary Equipment

The auxiliary services of the sub-station are supplied from a 50 kV.A. three-phase transformer. This provides low tension supplies for sub-station flood, lighting, etc., and for the small motor generator set which is used for charging a sixty cell battery installed for operating the oil circuit breakers.

Very complete arrangements are made for handling the sub-station plant. All transformers and 66,000 volt oil circuit breakers are provided with flanged rollers, and stand on concrete bases having rails registering with those on a transformer truck capable of being moved around the sub-station on a special track with turntables. The transfer truck can be moved beneath a gantry for lifting, or placed under cover in the sub-station building.

At present, the main transmission lines are being operated at 22,000 volts only, and temporary arrangements have been necessary to enable the sub-station to be placed in service. For this purpose, a 2,250 kV.A. bank of transformers having a ratio of 21,000/6,600 volts has been installed, which will however be released for other duties when the main transmission voltage is increased to the full value of 66,000 volts, enabling the present transformers to be used.

The Consulting Engineers for the whole scheme are Messrs. Rendel, Palmer and Tritton. The transmission line contract is being carried out by the British Insulated Cables, Ltd. The following notes on the overhead work, taken from *The Electrical Review*, gives some idea of its importance and the obstacles met with in erecting the line in a jungle country.

Transmission Lines

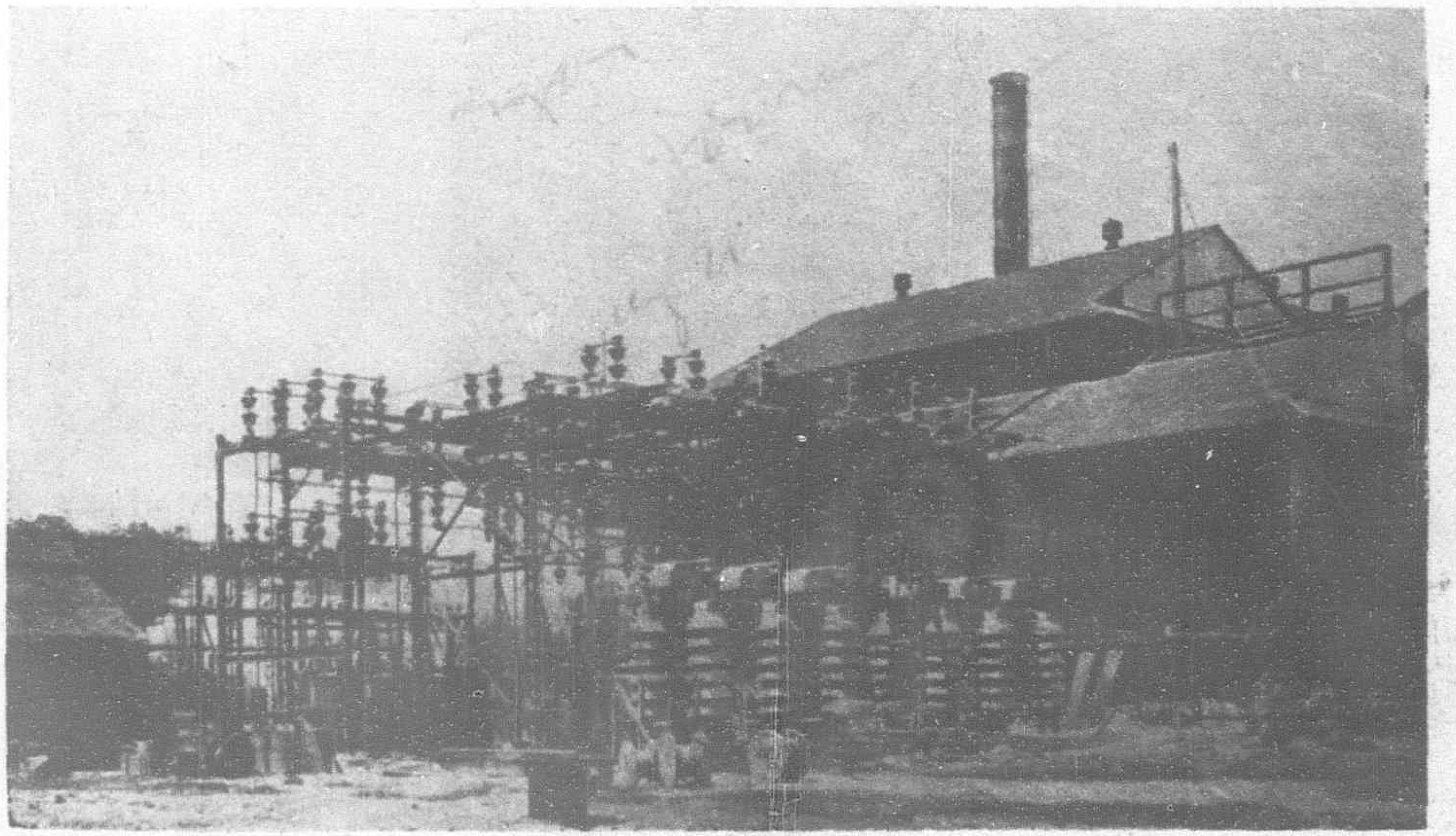
The lay-out of the overhead work will embody three systems at 66,000, 22,000, and 6,600 V, respectively. A primary 3-phase system at 66,000 V will be employed for coupling up the two stations at Chendorah and Malim Nawar, and also feeder outdoor sub-stations in the intervening districts. The main feeder will consist of a double circuit of six 0.125-sq. in. stranded copper wires supported on lattice-work steel towers normally 68-ft. high, with provision for extensions of 10-ft. in order to meet irregularities of the ground contour. The normal span is 660-ft. and a minimum clearance to the ground level of 20-ft. at 120 deg. F. is provided for.

The towers are of the square-base pattern, with separate earth footings at each corner leg. The grillage for these is set in a pad of concrete, and steel plates are attached to the stub below the ground level in order to provide against the lateral shear stresses exerted on the foundation. A continuous longitudinal 0.05-sq. in stranded copper earth wire is provided and is fixed to the apex of the tower. The route is approximately 60 miles long, exclusive of future branches. The insulators will be of the standard suspension type with six disks per string, the terminals being double-stringed sets.

A secondary 3-phase system at 22,000 V will be employed to provide for the more congested area round Malim Nawar, and it will be fed by the steam station at this town. The towers for this system are of similar design to those of the higher-voltage system, and are normally 50-ft. high; extensions are also provided for in this case. They are designed for single and double circuits, and will normally carry six 0.1-sq. in. stranded copper wires with a longitudinal 0.05-sq. in copper earth wire at the apex. The insulators will be of the petticoated pin type on straight-line work, with disk-type insulators at the terminals.

On both the above-mentioned systems three types of towers are provided, *viz.*, intermediate (straight line), angle and transposition. The terminations are made on to the steel structural work of the outdoor sub-stations. All the steel-work is of British manufacture and is galvanized. The present route length of the system is approximately 30 miles. A tertiary 3-phase system at 6,600 V will provide for distribution from the step-down sub-stations to various mines and villages. The conductors for this work will be of three different sizes, 0.046, 0.035, and 0.022 sq. in., with a copper earth wire of the last-named size. They will be supported on solid-drawn tubular steel poles by means of channel cross-arms and pin-type insulators, with terminating insulators of the single-disk type. The branch lines at present provided for total 50 miles.

(Continued on page 44).



Malim Nawar Sub-station

Penang Harbor—An £800,000 Improvement Project

Among the papers laid before the Straits Settlements Legislative Council at its last meeting was a report by Messrs. Coode, Wilson, Mitchell and Vaughan-Lee on the proposed extension of Weld Quay and other improvements in Penang harbor. The report includes two very large drawings showing an area of over 200 acres to be reclaimed, sea walls and piers to be constructed and a huge area to be dredged.

The report states that Mr. S. R. H. Beard came out from England to carry out the necessary investigation. He sailed from Home on January 4, 1928, and returned in September of that year, since which time up to the date of the report he had been engaged in completing his records and considering the report to be made.

Weld Quay Reclamation

There were three propositions Mr. Beard was asked to report on: Weld Quay reclamation, improvement of Sungei Penang and extension of Swettenham Pier and reclamation in connection with it. With regard to the first proposal, the report adheres to the original proposition made by the same persons in 1907 for the formation of a reclamation in front of Weld Quay, its seaward margin following the line of low water. The work being commenced from the northern end is, from an engineering point of view, the right one.

They fully realize, however, that conditions have altered since 1907 and understand that certain questions which have arisen in regard to foreshore and frontage rights render inadvisable, for the present at any rate, the carrying out of that portion of the 1907 scheme lying to the northward of Market Street.

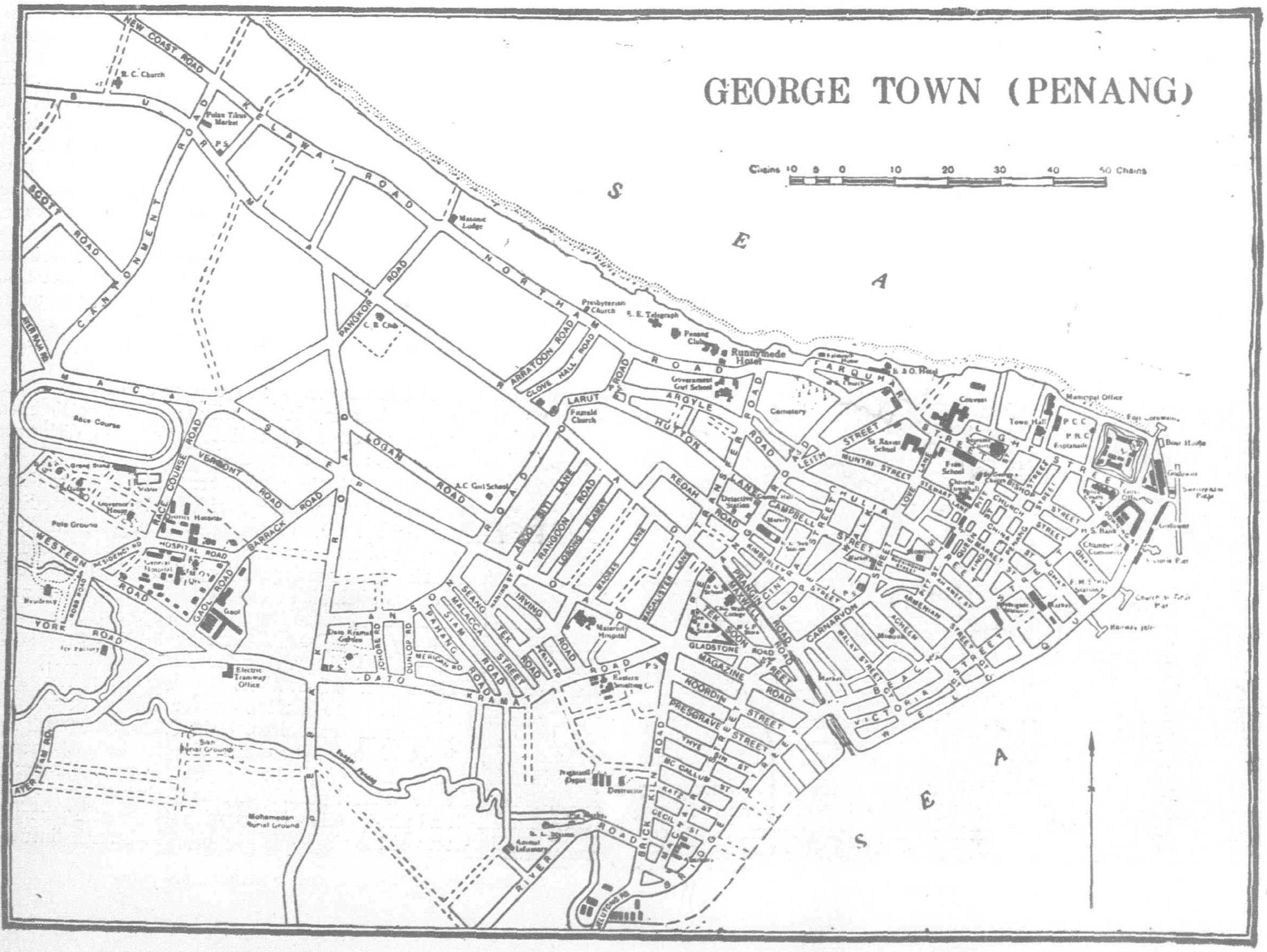
Since 1907, also, it would appear that the congestion has greatly increased, this being the main subject of the Weld Quay report dated March 9, 1927. The report stated that the great bulk of all cargo, European and Chinese alike, using Weld Quay, was landed and shipped from port over a distance of only about 380 feet. " Whereas in 1907 some 5,000 feet of the length of Weld Quay was more or less available for landing and shipping goods, that length is now reduced to some 1,800 feet to the north of Chulia Street." " The congestion on the 380 feet has to be seen to be appreciated." The report goes on to say that to " attempt now to reclaim any part of the area between Harbor Board godown No. 5 and a point to the south of the Federated Malay States Railway Pier would concentrate the trade of the Port on a shorter length of the quay and thus increase the congestion it is desired to relieve."

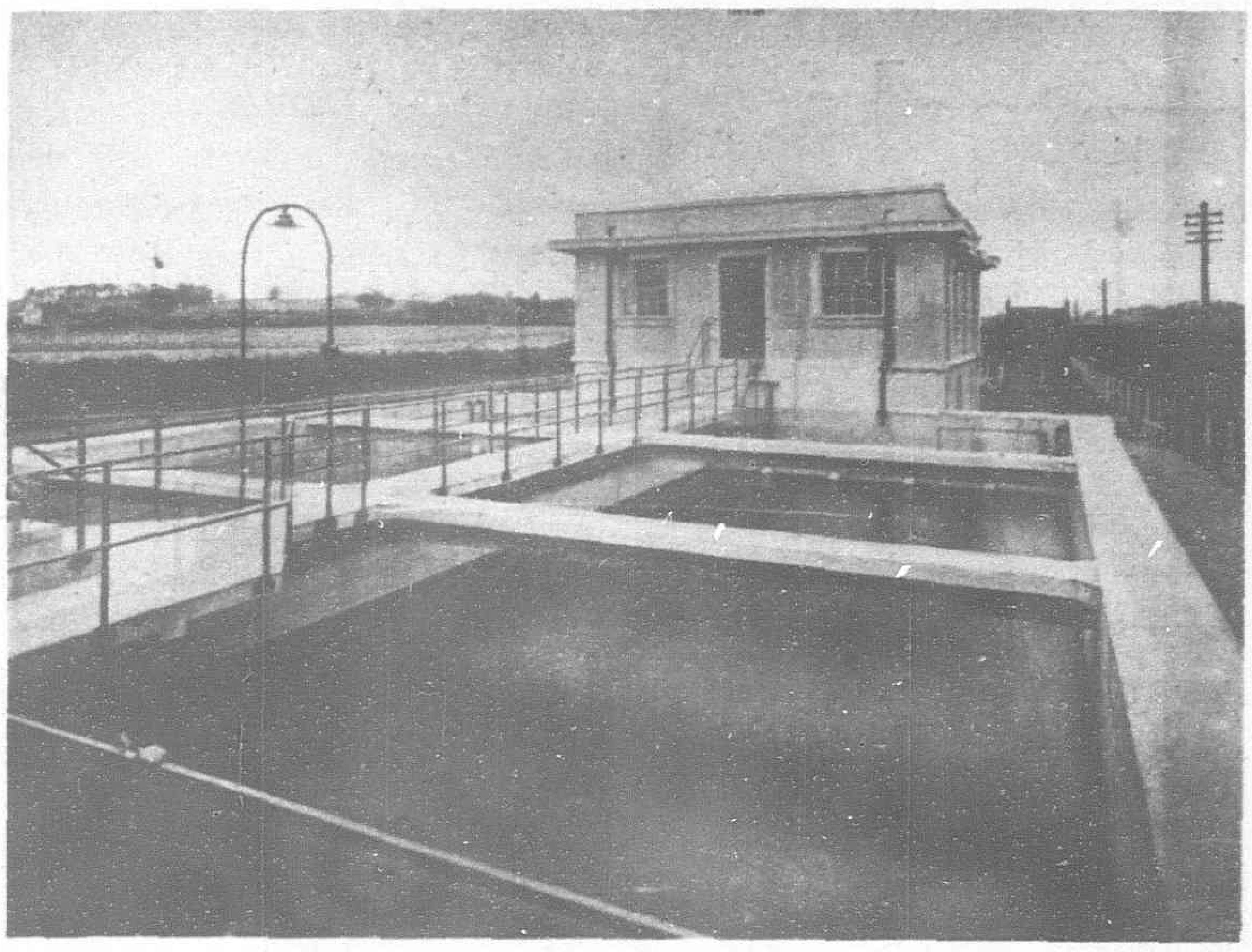
It will be seen from the above quotation, says *The Times of Malaya*, that the practical difficulty of carrying out reclamation work in front of Weld Quay without increasing the existing congestion is very great. The difficulty was met by the Weld Quay Committee by their recommendation to carry out a detached portion of the reclamation, leaving the Weld Quay uninterfered with between the Harbor Board Godown No. 5 and Market Street ghaut. From an engineering point of view this is not entirely satisfactory, inasmuch as silting is bound to take place, probably rapidly, in the pocket which would be formed to the north of the proposed reclamation. Nevertheless, under present conditions, a scheme somewhat on these lines appears to be the only practical one now available. The estimated cost of the work is £295,000.

Improvement of Sungei Penang

Sungei Penang is a small tidal river rising in the hills at the back of the town. The catchment area is small, amounting to only about 13,000 acres. Some little way from its mouth the river is crossed by the Sungei Penang bridge at Jelutong Road, having an available headway of about 7 feet at high water spring tides. Below

(Continued on page 44).





Paterson System Filtration Plant at Sandfields, England

Sludge Tanks and Press House

Working Platform and Central Gangway in Filter House

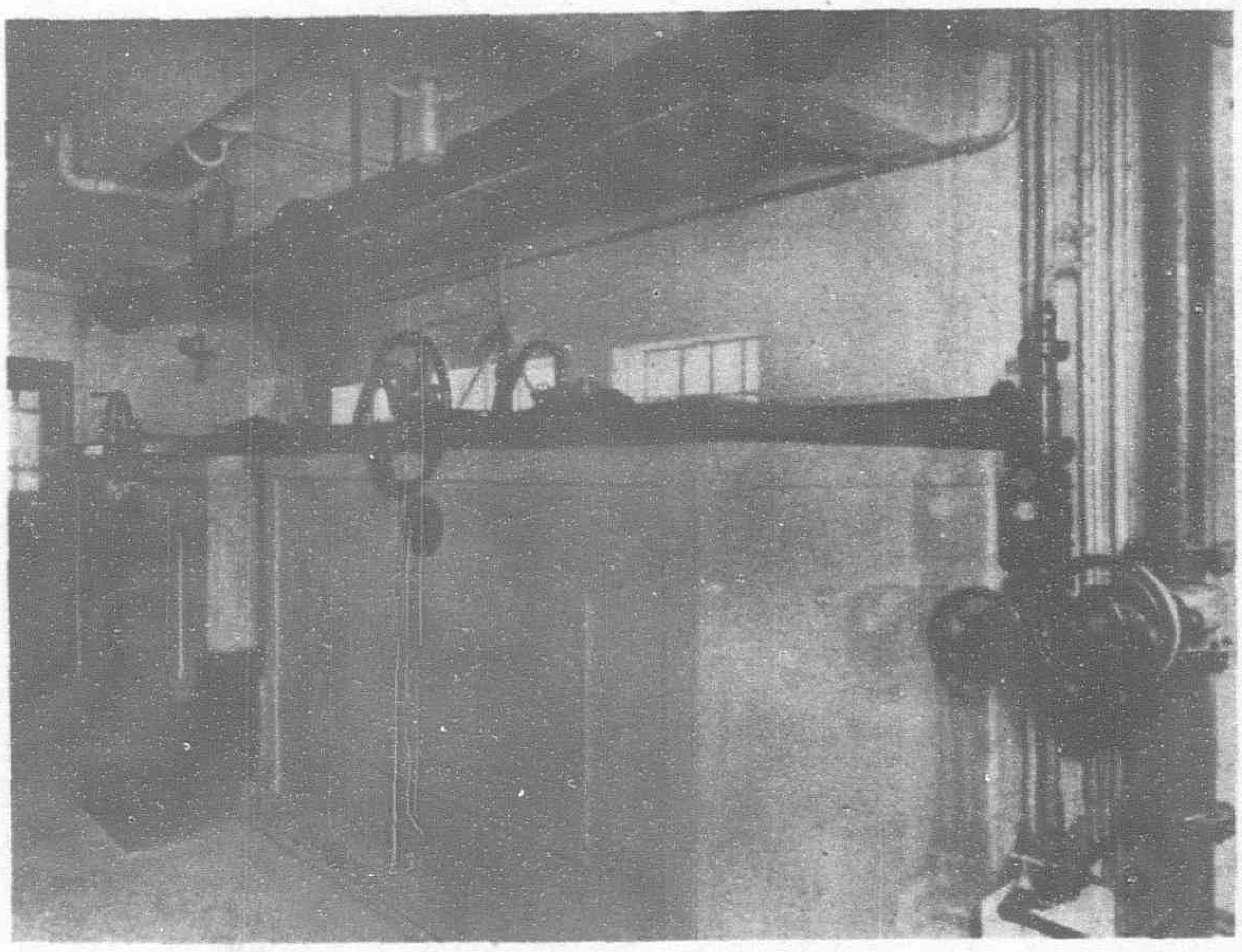
Water Filtration for Steel Works

Important New Plant for Japan

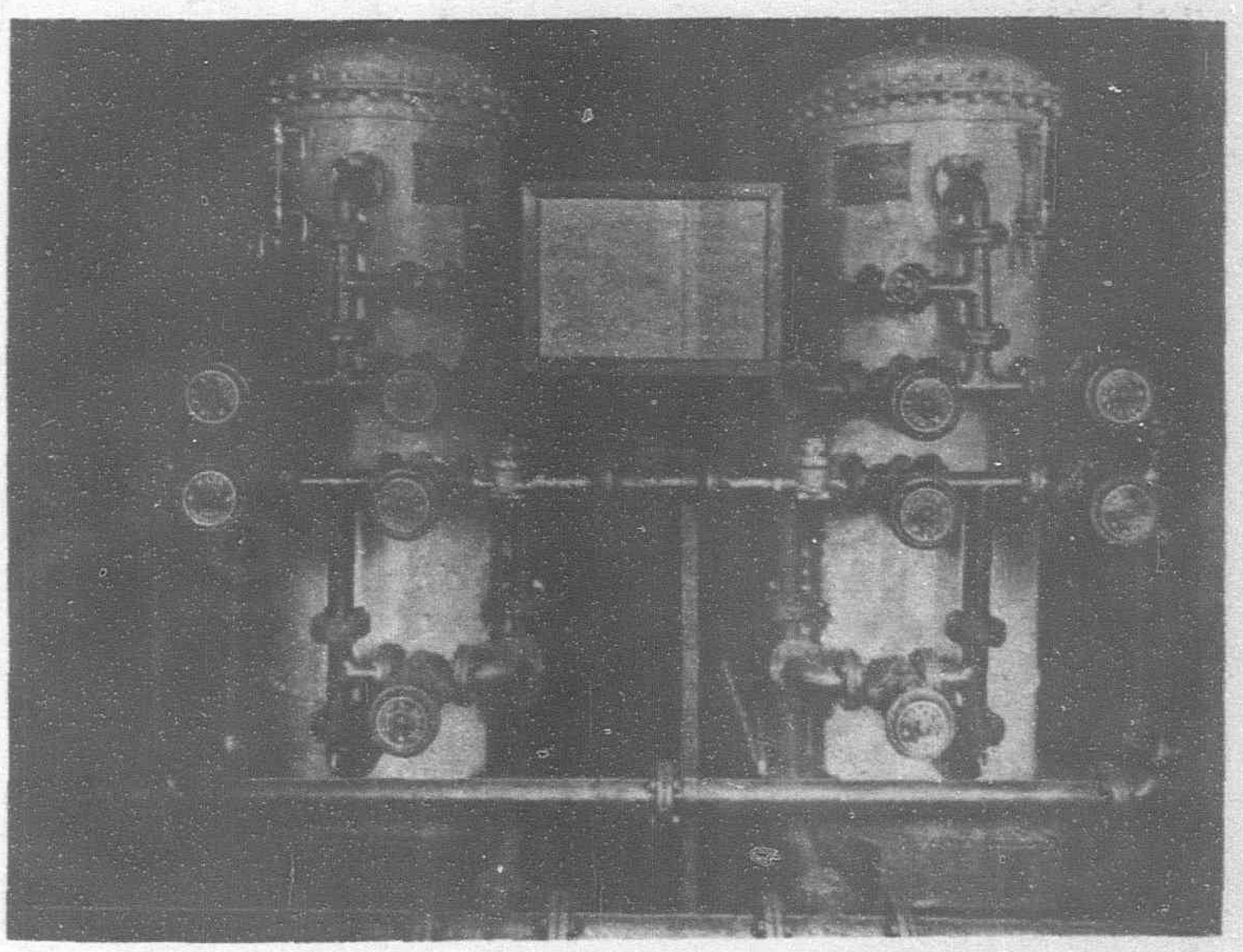
THE Imperial Steel Works at Yawata, Japan, have placed a contract with the Paterson Engineering Co. Ltd., London, for a very large rapid gravity sand filtration plant. The capacity is 40 metres of water per minute (12,662,000 gallons per day), and the plant is to be arranged for extension at a later date to 60 cubic metres per minute (19,000,000 gallons per day.)

The water supply to the blast furnace and general steel plant at Yawata is of a particularly difficult character as regards suspended material, and this is an unusual and interesting example of the use of large modern rapid gravity filters, such as generally used for towns water supply, in the iron and steel industries. Full details are not yet available but a battery of standard Paterson Rapid Gravity Filters are to be installed constructed of re-inforced concrete on the Hennebique system.

These filters are in wide use for municipal water works all over the world. Several important installations are to be found in Japan, China, Hongkong, the Malay States and India, while it may be mentioned a very large installation of 48,000,000 gallons per 24 hours at Kempton Park for the Metropolitan Water Board (London), was formally opened by the Minister of Health on the 24th October last. A plant similar to the one ordered for Yawata is operating at the Jamshedpur Works of the Tata Iron and Steel Co., Ltd. in India. The filter consists of a rectangular ferro-concrete tank filled with a deep layer of graded sand through which the water flows by gravity, thus giving the filtration. For cleaning purposes compressed air is used, the bed of sand being blown up for a few minutes at intervals, say every 24 hours, to disentangle the separated impurities, which are swept away to the drain by momentary reversal of the water flow by means of suitable valves. The filter is then ready again for use at once, the same sand lasting for years, and generally, as in the present case in Japan, a battery of such filters is used with suitable valves and pipe connections. Also when necessary various accessory equipment may be included to give a continuous supply of clear pure water, and for example. if the drainage area is moorland, the water may be stained a brownish color, due to peat, and this is taken away by first treating with coagulent, such as alumina, before passing through the sand filters,



Alumina Solution Tanks



Paterson Softening Plant on Cunard Liner "Coronia"

Copper Steel

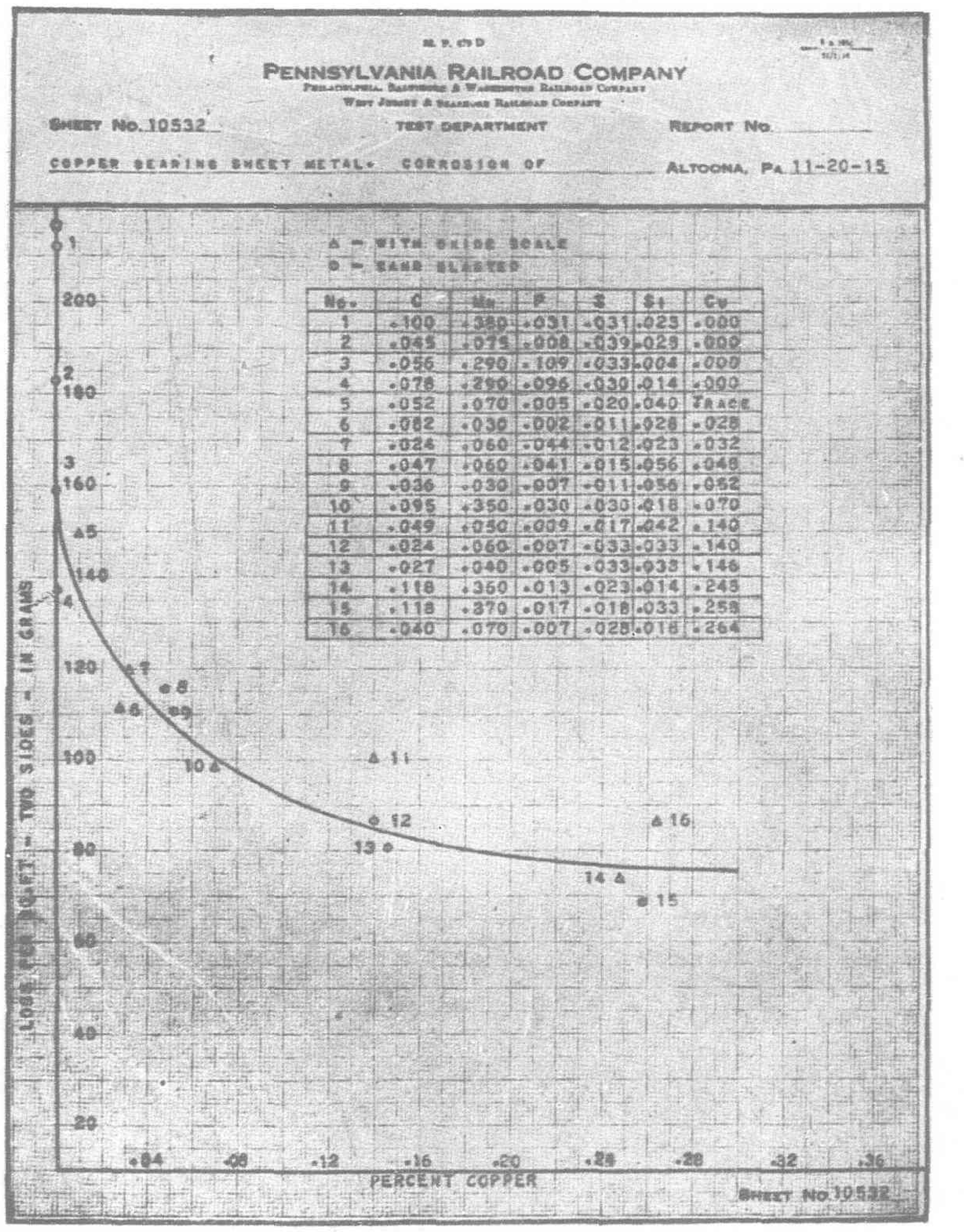
The following interesting article on "Rustproofing of Steel Materials" by Dr. M. E. McDonnell, Chief Chemist of the Pennsylvania Railroad System, Altoona, Pa., although written some time ago, is extremely timely at present in view of the renewed interest in railway equipment in the Far East.

The research department of the Pennsylvania Railroad System has been actively studying rust and corrosion for years, and the protective measures suggested by experiment have been applied on a broad scale by the management. This would, therefore, appear to be an opportune time to review what has been accomplished.

In considering the effect of the destruction of steel due to rust, it should be remembered that the loss of 1,000 tons of steel gives a depletion to our national resources equivalent to 2,000 tons of ore, 4,000 tons of coal, more than 500 tons of limestone, together with losses of magnesite, chromite, manganese, etc., and that even now most of our manganese ore and some iron ore are being imported. The labor required in assembling these involves a large number of man-hours. Also consideration of the loss due to rust cannot be confined to our material welfare. Rust and corrosion frequently impair the strength of structures, thereby endangering lives.

In nature the metals usually used for structural purposes normally occur as compounds such as oxides or sulphides, and not in the free metallic state. Through metallurgical operations of an artificial character, involving high temperatures and reducing atmospheres, the metals are obtained. Under the influences of nature these metals normally revert to the same type of compounds from which they originated. The structural materials used by the engineer are not in equilibrium and all of them are under a potential pressure to revert to a balanced state. This change of state is commonly termed "corrosion." The mechanical engineer must ever bear in mind this corrosive force in the selection of his materials, as well as their subsequent protection.

Engineers now know that commercial steel on the market varies greatly in its tendency to rust. As previously stated, we have made many tests for the purpose of developing resistance to corrosion. On August 1, 1912, we exposed 15 weighed commercial steel sheets on the roof of the locomotive test plant in Altoona. These sheets were carefully analyzed and on February 13, 1913, after six and one-half month's exposure, they were wire-brushed and re-weighed. It was found that the rate of rusting varied much, the minimum loss being 30.12 grams, and the maximum loss 84 grams on the two sides of a square foot of the various sheets undergoing test. The results are shown in Fig. 1, and it is to be especially noted that the sheets showing the lowest losses in weight, contained copper. The curve on the plot shows the copper content. This heretofore unpublished chart was prepared in 1915 and it was largely instrumental in bringing about the decision of the Pennsylvania management to adopt copper bearing steel for car roofs.



No.	C	Mn	P	S	Si	Cu
1	.100	.380	.031	.031	.023	.000
2	.045	.075	.008	.039	.029	.000
3	.056	.290	.109	.033	.004	.000
4	.078	.290	.096	.030	.014	.000
5	.052	.070	.005	.020	.040	TRACE
6	.082	.030	.002	.011	.028	.028
7	.024	.060	.044	.012	.023	.032
8	.047	.060	.041	.015	.056	.048
9	.036	.030	.007	.011	.056	.052
10	.095	.350	.030	.030	.018	.070
11	.049	.050	.009	.017	.042	.140
12	.024	.060	.007	.033	.033	.140
13	.027	.040	.005	.033	.033	.146
14	.118	.350	.013	.023	.014	.245
15	.118	.370	.017	.018	.033	.258
16	.040	.070	.007	.028	.018	.264

Fig. 1.—Variation in the Rate of Corrosion of Steel

Test Determining the Life of Sheet Steel

A more vivid illustration of the variation of the durability of steel is the progress of failure of a lot of 258 16-gage and 230 22-gage sheets of plain carbon and copper bearing steel, which was exposed for test purposes in Pittsburgh, Pa., on December 12, 1916, by a committee of the American Society for Testing Materials, of which I was a member. After 16 months' exposure of the sheets some of them contained holes or ragged edges. The records show that 30 22-gage plain carbon sheets failed in 16 months, while no copper bearing sheets failed in that length of time. After 28 months' exposure some of the panels had turned entirely to rust. The number of 22-gage plain carbon failures had increased to 77, this being more than 92 per cent. of this class of sheets. During the same period only six 22-gage copper bearing sheets had failed, and it should be stated that none of them contained manganese. Fig. 2 shows the racks after 75 months' exposure. Many gaps are shown from which entire sheets of plain carbon steel had disappeared as rust, in which the oxide may have been associated with some sulphate of iron. At the end of that period every 22-gage plain carbon steel sheet had failed, while 23 copper bearing 22-gage sheets were free from holes or ragged edges. Also, at the end of that period, 102 of the 126 16-gage plain carbon steel sheets had failed, while there was not a single failure among the 132 16-gage copper bearing steel sheets. The average life of the copper bearing 22-gage sheets on this test was over 49 months, while the average life of the 84 plain carbon steel sheets was 23 months. The results of this test are fully recorded in the Annual Report for 1923 of the American Society for Testing Materials. Our tests of 1913, together with the obvious outcome of the A. S. T. M. Pittsburgh test, led the Pennsylvania management in 1919 to adopt copper bearing steel for all sheet steel to be used in cars.

A question which doubtless comes to mind at this point is, what will be the effect of this change in the composition of steel which was made in 1919. We do not know the answer to this question. The destruction of a car is not due entirely to rust. There is some destruction due to abrasion and wear, also to the action of acid such as may develop when wet coal is stored in cars. Car sheets are sometimes destroyed mechanically in the removal of wet or frozen lading. The tests cited indicate that the steel now being used is more than twice as resistant to atmospheric corrosion as the steel formerly used. The various factors have been carefully considered and we shall expect a 50 per cent. increase in life, due to the change from plain carbon to copper bearing steel.

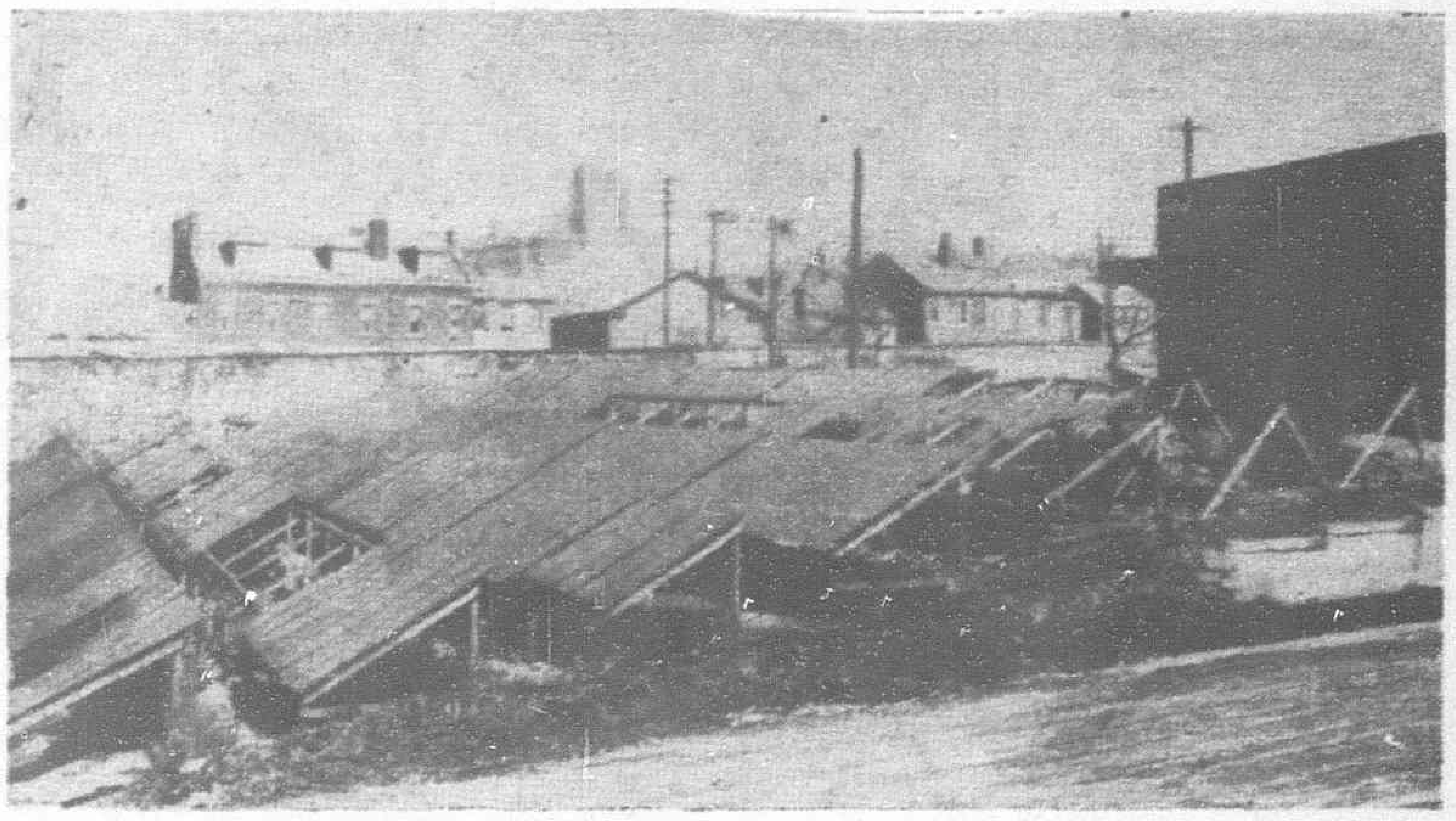


Fig. 2.—Test Rack at Pittsburgh, Pa., on which Sheets were First Exposed December 12, 1916. The Effects of Corrosion March 9, 1923

There are 135,523 open all-steel freight cars on which much maintenance data is available. After they have been in service for a number of years, the sheets become thin and holes develop. When they have reached this condition it is possible to patch the failed sheets, but if this is done, the surrounding sheets are likely to fail and the cost of this kind of maintenance is likely to become excessive. When failure of sheets begins to occur due to rust, it is better to apply Class 1 repairs, which involve cutting all rivets, removing the sheets, and rebuilding the car body. The age of the car at which this class of repairs is called for varies some, depending on the design and service. The standard four-hopper coal car designated H2la now requires this attention after ten years of service. The two-hopper coal car of the Gl type is of slightly more rigid construction than the four hopper car. It will run somewhat longer than ten years prior to Class 1 repairs, possibly as long as 12 years. On the other hand, on the gondola car of the Gsd type, the sheets fail after approximately eight years' service. This rapid failure is partly due to the fact that this car does not drain and dirt accumulates in it, which when wet, accelerates rusting. We have prepared a statement (Table 1) showing the cost of maintaining car bodies, in which the calculations are based on an average length of life for the plain carbon steel, which is ten years between Class 1 repairs. The results in columns one to four, inclusive, are from actual data, while those in column five are averages of the other four. The estimates of materials and cost of maintenance for copper bearing steel cars represent an anticipated 50 per cent. greater durability than for the plain carbon steel cars, or a 15-year service prior to Class 1 repairs. No allowance is made for painting the cars or for any repairs to the underframes, trucks or brake equipment. The increased cost of cars due to the use of copper bearing steel is shown. This is obtained by applying the differential of $3.00 per ton which has prevailed between plain carbon and copper bearing steel plates. This amount may diminish when the amount of copper bearing scrap now being used by the steel makers is increased. In making the calculation, allowance is made for losses in fabrication caused by shearing and punching. It is shown that the 135,523 cars involved would have cost $2,509,295.86 more if they had been made of copper bearing steel. The statement shows the amount of new finished plates, shapes and rivets, as well as the cost of material and labor, including shop expenses, required to dismantle and rebuild car bodies. If these cars are given Class 1 repairs over a period of ten years, using plain carbon steel sheets, the annual cost under present market conditions amounts to approximately $5,069,112.03. From the experimental data at hand to date, it may be assumed that with the use of copper bearing steel, the interval between Class 1 repairs will be extended over a 15-year period and repairing with copper bearing steel sheets reduces this cost to approximately $3,473,710.30. This represents an annual saving of $1,595,401.73, and an annual reduction of 22,385 tons in the amount of new steel required.

TABLE I—COST OF STEEL CAR MAINTENANCE AS AFFECTED BY RESISTANCE TO RUST

	Four-hopper coal car Class H21a	Two-hopper coal car Class Gla	Two-hopper coal car Class Glc	Gondola car Class Gsd	Miscellaneous hopper and gondola cars Classes Gs, Gsa, G22, H22, etc.*
Number of cars in service	34,854	30,071	6,183	22,431	41,984
Light weight of car, lb.	50,700	39,500	39,000	40,700	......
Finished plates and shapes in a new car: Weight. lb.	13,293	9,292	13,124	9,675	11,346
Cost, if plain carbon steel	$354.79	$248.00	$350.28	$258.23	$302.83
Cost, if copper bearing steel	377.26	263.71	372.46	274.58	322.00
Increased cost per car using copper bearing steel	22.47	15.71	22.18	16.35	19.17
Class 1 repairs—per car, basis:...Finished plates and shapes, lb.	10,670	7,461	11,081	7,830	9,261
Rivets, lb.	870	793	730	870	816
Gross cost of finished plates, shapes and rivets, including stores expenses:					
Plain carbon steel	$309.80	$225.12	$317.74	$252.85	$276.37
Copper bearing steel	327.04	237.18	335.65	265.50	291.34
Credit for scrap	38.47	27.51	39.70	29.00	33.67
NET:					
Plain carbon steel	$271.33	$197.61	$278.77	$223.85	$242.70
Copper bearing steel	288.57	209.67	295.95	236.50	257.67
Labor directly applicable	120.35	90.10	81.48	91.30	95.81
Shop expenses directly applicable	54.34	40.86	36.59	40.99	43.20
TOTAL:					
Plain carbon steel	$446.02	$328.57	$396.84	$356.14	$381.71
Copper bearing steel	463.26	340.63	414.02	368.79	396.68
Annual cost per car of Class I repairs to finished plates and shapes:					
Plain carbon steel car, ten year renewal	$44.60	$32.86	$ 39.68	$35.61	$38.17
Copper bearing steel car, 15 year renewal	30.89	22.71	27.60	24.59	26.45
Saving per car per year	$13.71	$10.15	$12.08	$11.02	$11.72
Total anticipated saving	$477,848.34	$305,220.65	$74,690.64	$247,189.62	$491,524.48
Plain carbon steel and rivets, lb. per car per year	1,154	827	1,181	870	1,008
Copper bearing steel and rivets, lb. per car per year	769	551	788	580	672
New steel saved, lb. per car year	385	276	393	290	336
New steel saved per year, tons	6,709	4,155	1,216	3,252	7,053
Difference in cost between carbon and copper bearing steel for the 135,523 new cars					$2,509,295.86
Total anticipated saving per year for the 135,523 cars due to slower rusting of copper bearing steel					$1,595,401.73 22,385 tons of steel

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*All figures in this column are average estimates.

Another important advantage gained by the reduced number of shopping periods is the increased number of days that the cars are serviceable. No attempt has been made to capitalize this advantage, and the gain does not show in Table 1. Transportation officers and shippers well know the serious consequences which may result from lack of the necessary cars to convery the commodities of a community.

Numerous other economic factors enter, which are very patent to students of political economy. The reduction in the amount of steel required, making due allowance for scrap returned to open-hearth furnaces, reduces the ore consumption some 20,000 tons, and coal consumption not far from 80,000 tons. Numerous other items conserved include chromite, magnesite, compressed oxygen gas, acetylene, fuel oil, etc. Of even greater importance is the conservation of labor, which can be diverted to other channels. They are all contributory factors to what Mr. Hoover includes under "deduction from the goods and services we might all enjoy."

Those who have had practical experience with steel may have noticed that ordinary steel forms a light brown, loose rust on oxidation, while copper bearing steel oxidizes on the surface to a dense, dark brown, adherent coating, and this is believed to act as a protective measure against rapid destruction. Other similar examples of oxidation protective coatings are well known to the engineer. A bright copper roof has a rapid initial rate of corrosion, but the green coating formed on exposure soon retards further progress. Bronze has a rapid initial rate of oxidation, but the beautiful adherent coating arrests destruction. Zinc is very readily corroded, but the coating formed protects the base metal. In the selection of materials for engineering structures, the character of the coating formed on oxidation deserves careful consideration. Rust-proofing coating may, therefore, be induced by the use of a small percentage of an element or ingredient which, on oxidation, produces a protecting film.

In the tests cited, special reference has been made to the profound influence of copper. We would not have you infer that other elements present in small quantities do not influence the rate of rusting. In the absence of copper, a high sulphur content stimulates corrosion. In the presence of copper, a small percentage of manganese improves the resistance of the protective coating formed on oxidation. The presence of chromium in steel increases its rust-resisting properties and the so-called "stainless" steel which is now being used for cutlery and other small parts where great rust resistance is essential, contains approximately 13 per cent. of chromium. However, various causes, such as the limited amount of chromium ore available, the high cost of its reduction, and the difficulties encountered in rolling stainless steel, will likely prevent its use for general structural purposes.

Designing engineers are, therefore, urged not to rely solely on physical tests when adopting specifications for steel to be purchased for structural purposes, if the material purchased is for other than temporary structures. Chemical engineers are making active search for new additions which will advance the state of the art to a still greater degree of efficiency.

Pieces of steel which are identical in chemical and physical properties disintegrate at varying rates if subjected to different influences. In the absence of oxygen or free mineral acids, the rate of destruction is slow. In the presence of oxygen, some natural waters quickly form a protective coating due to the presence of salts which they carry in solution. Pure water does not form these coatings.

In the application of laboratory tests or experimental installations the results obtained apply only to the conditions under which the tests were made. It has not, to our knowledge, been definitely proven that copper bearing steel has any merit in forming a protective coating on submerged structures, or for boiler tubes. Pieces of all of the sheets exposed on the Pittsburgh test rack were immersed in mine water at Calumet, Pa., in the Potomac River at Washington and in the Severn at Annapolis, but in these tests no effect could be attributed to copper. Monel metal offers marked resistance to corrosion under normal atmospheric tests, but corrodes rapidly in sea water if electrolytic currents are set up due to contact with other metals or other causes.

Electrical Developments in the F. M. S.

(Continued from page 39)

An entirely separate communication line will also be provided; this will consist of single and double metallic circuits of 100-lb. bronze wire supported by steel poles on single insulators on brackets. The minimum distance between the communication and transmission lines is to be 35-ft. In order to provide for additional protection from inductive interference, the whole of the insulators are being supported on single brackets to facilitate rotary construction, in addition to the e.h.p. lines being periodically transposed.

Before erection a great amount of jungle had to be cleared, and this is one of the chief difficulties the construction gangs have had to contend with; in this connection survey and clearing parties have been sent ahead of the working gangs.

All the materials used on the work are of British manufacture, and the following list gives the total amounts required and the suppliers :—Steel towers, 700 (approx. 1,500 tons), supplied by Messrs. C. T. Wilkinson, Ltd. Tubular steel poles, 1,300, supplied by Messrs. Stewart & Lloyds, Ltd. Telephone steel poles, 2,000, supplied by British Mannesmann Tube Co., Ltd. Six-disk insulator strings, 2,000, supplied by Messrs. Bullers, Ltd. Single-disk insulators, 2,000, supplied by Messrs. Bullers, Ltd. 22-kV pin-type insulators, 1,000, supplied by Messrs. Bullers, Ltd. 6.6-kV pin-type insulators, 4,500, supplied by Messrs. Bullers, Ltd. Telephone-line insulators, 5,000, supplied by British Insulated Cables, Ltd. Channel arms, brackets, guards, and line fittings, supplied by British Insulated Cables, Ltd. Copper conductors, various sizes, 700 miles, supplied by British Insulated Cables, Ltd. Telephone wire, 180 miles, supplied by British Insulated Cables, Ltd.

Switchgear

The contracts for the whole of the switchgear, including the complete equipment of all the outdoor stations as well as the Low Tension control gear, etc., were entrusted to the Metropolitan-Vickers Electrical Company, Ltd. The work includes such an immense variety of apparatus, that any description calls for a separate article.

Penang Harbor

(Continued from page 40).

the bridge are the Public Works Department yard and stores, the United Engineers, Ltd., factory, rice and oil mills and a fish-curing establishment. Above the bridge are various business premises including those belonging to Messrs. Huttenbach Lazarus & Co., the Asiatic Petroleum Co., the Municipal pig market and others. It will be seen, therefore, that the river affords access to several important establishments.

Unless very costly works are undertaken, it will not be possible to maintain the bed of the river at a lower level than approximately that of low water ordinary spring tides. This would give a depth of from, say, 4 feet 6 inches to 8 feet 3 inches at high water neap and spring tides. The use of the river would therefore be confined to the period round about high water, and then only for craft of very limited draft.

The cost of the work including quay wall, rubble banks, and reclamation, together with dredging the river bed to the level of low water ordinary spring tides, is estimated at £190,000.

Extension of Swettenham Pier

Instead of extending Swettenham Pier, the plan provides an additional deep water berth by constructing a quay wall commencing near the existing Kedah Pier and extending in a northerly direction for a distance of 650 feet giving a berth 600 feet long with a minimum depth of 35 feet at L.W.O.S.T. The wall would be constructed of concrete blocks founded upon rubble stone laid up on the sand.

At the back of the wall there would be a reclamation, providing an area of 3½ acres for quay space, roads and godowns. The north and west sides of the reclamation would be protected by rubble banks. The quay wall itself, with the reclamation, would afford the necessary protection from sea and tide to vessels berthing alongside. There would doubtless be accretion to the westward of this arm and along the front of the Esplanade, but this would all be to the good should it later be desired to carry out Lieut-Commander Peal's complete reclamation scheme. But the proposed berth should be quite satisfactory, both in regard to shelter and ease of berthing, though the assistance of a tug would be required for handling vessels to and from the quay at certain states of the tide. There would be some tendency to a deposit under the lee of the wall which would require to be removed from time to time. The cost of this scheme would be £316,000.

Engineering Notes

ELECTRIC LIGHT, POWER AND TRACTION

THE AGATSUMAGAWA ELECTRIC POWER CO.—The Otsu power station, 2,000 k.W. of the Agatsumagawa Denryoku K.K. will be completed by April. The company is preparing to proceed with the second part of its plan, and will build Nishikubo Power station 18,000 k.W. and Imomata Power station, 7,000 k.W. on the Agatsuma River. Work has already started on the foundations of these stations, which on completion will increase the output from 23,000 k.W. to 50,000 k.W.

CHINA LIGHT & POWER CO.—Mr. R. G. Shewan, who presided over the annual general meeting of the China Light & Power Co., Ltd., shareholders, was able to give a very satisfactory review of the last year's working. Gross profit had increased to nearly $545,000 as against $531,000 the previous year, and a final dividend of 9 per cent., making 14 per cent. for the year, had been recommended.

Units sold showed an increase of 29 per cent., and so great was the Company's development that the Directors had sought the services of Mr. A. H. Preece, a well-known London expert, who had reported most satisfactorily on the Company's position and policy.

KYUSHU SODEN K.K. (The Kyushu Electric Transmission Co., Ltd.).—The Kyushu Soden K.K. has completed the 39 kilometers transmission line from Tashiro Power Station with 8,000 k.W. and at present under construction on the Mimi River in Miyagi Prefecture to Takachiho Substation of the Kyushu Suiryoku Denki K.K. (Kyushu Hydro-electric Co., Ltd.). This transmission line was constructed under the contract to supply the power from Tashiro Power Station to the Kyushu Suiryoku Denki K.K., so that the latter can supply this power to the Kurume district. After the completion of the Tashiro Power station, the Kyushu Soden K.K. is further planning to build larger power stations, one at Yamasuhara with a capacity of 13,000 k.W. and the other at Tsukahara with 50,000 k.W., the latter of which will be situated on the upper stream on which the Tashire Station is being built.

ELECTRIFICATION IN THE PHILIPPINE.—The Furukawa Plantation Co., one of the leading industrial concerns of the Davao district, has recently purchased a new plant from the Pacific Commercial Co., to complete electrification of their outfit.

A 260-horse power Fairbanks-Morse Diesel engine will drive a 220-kVA., 2,300-volt, 3-phase General Electric generator. Power is to be transmitted to two plants, where the voltage is to be stepped down by means of 3-phase G. E. transformers to 440 volts, and used to run a number of motors. All of the equipment used in the working of hemp will be motor driven. The secondaries of the transformers are so arranged that 220 volts can also be obtained for lighting purposes.

The installation is expected to be completed early in 1930, and will be one of the most up-to-date industrial plants in the Philippine Islands. Even the small water circulating pumps in the power plant will be driven by electric motors, and all of the houses on the plantation will have the benefit of electric light and power.

It is also of interest to note that a 75-horse power synchronous motor of 80 per cent. leading power factor is to be installed in the main plant to correct the power factor of the system. This is a convenient and very practical system of correcting any possible future trouble of overloaded lines, due to low power factor, and will be of interest to all industrial men contemplating electrification of their plants.

TOHO DENRYOKU K.K. (The Toho Electric Power Co., Ltd.).—The Toho Denryoku K.K. has decided to increase the capacity of Najima Steam Power station from the present 40,000 k.W. to 90,000 k.W. considering an increase in demand in future. The company will start the extension from the next year. It is reported that Shimonoseki steam power station capacity is also increased to 20,000 k.W. from 10,000 k.W.

TRANSMISSION LINES IN MANCHURIA.—In order to meet the rapidly increasing wants for electric light and power, the Port Arthur Civil Administration has arranged to obtain a supplementary supply of power from the Amanogawa Power Station of the South Manchuria Electricity Co., Shakako, Dairen.

At the outlay of Y.330,000, specially high pressure transmitting lines of 11,000 volts have been laid between the Amanogawa Power Station and Port Arthur over the distance of 36 kilometres, besides a transforming station, just completed at Port Arthur.

As soon as the new installation is proved satisfactory to the Oeneral Post Office experts, the supply from Amanogawa will be commenced.

INDUSTRIAL

JAPAN'S SOUTH SEA PROJECT.—The Oriental Development Company is now studying a most practical means of investing in rubber, cocoanut and the like cultivation enterprises in the South Seas with a capital of 50,000,000 yen. The authorities as soon as the draft plan is complete will consult the Government as well as the Overseas Affairs Ministry with the project that it may be launched in the course of next fiscal year. The Development Company, when the plan is mature, will first advance the sum of Y.20,000,000 to the willing Japanese enterprisers in the South Sea islands.

OIL PROSPECTING IN BRUNEI :—The British Malayan Petroleum Co., Ltd., is continuing prospecting in Brunei, and hopes are now entertained that their operations may be successful. Oil was first found in the territory at Labi, close to the boundary of Sarawak, in 1914, and the original well continues to supply sufficient oil for the requirements of drilling operations. Elsewhere good shows of gas have been obtained, but no further occurrences of oil have been met with. However, the company began more active operations with a Rotary drill at the end last year, and oil prospecting licences are being operated for a considerable distance along the Coast eastwards from the Belait river, and are considered to show possibilities of oil being obtained in large quantities.

ASSOCIATED OIL AND MITSUBISHI PLANT.—A definite understanding has been reached between Associated Oil of America and the Mitsubishi Goshi Kaisha for starting in Japan a joint oil refining and distributing enterprise. A capital stock of Y.5,000,000 will be subscribed half and half and working funds will be amplified by additional Y.2,000,000 of unfunded debt. The Associated Oil will contribute manufacturing skill and machinery as well as it will guarantee an uninterrupted supply of crude oil. Mitsubishi men will be named for president and managing-director and a vice-president will be an Associated Oil man.

A refining plant will be located in Tsurumi equipped to produce 7,500,000 gallons of gasoline a year. The manufacturing facilities will be complete by March next year and the first shipment will be out toward some time next autumn.

AN OIL FIELD IN SZECHUAN.—The *Shun Pao* contains a report from Szechuan as to the discovery of a kerosene area, in the P'eng Ch'i district, which gives good promise of proving a valuable source of supply of this useful commodity. The district referred to abounds in salt wells, which are holes bored deep into the earth, from which brine is drawn for the manufacture of salt. It appears that over thirty years ago a source of oil was unexpectedly tapped, the impression at first being that the product was some unusual kind of water, until a light was accidentally applied, when the liquid burned. It was then used to supply the heat for evaporating the brine, but only in very small quantity. In 1896, a Mr. Li, of Chungking, proposed the use of modern appliances to develop the oil industry. About that time many local disturbances took place, interfering with the work, and then came the Boxer uprising in the course of which the well was destroyed and all work stopped.

Interest has now been revived, and a Swiss expert who has examined the locality, is said to have reported that it may prove to be the world's fourth largest oil field. Permission is now being sought to proceed with the development of the industry, and it is hoped that this may be so successful as to supply China's needs, and so avoid having to import foreign petroleum.

RAILWAYS

TOKYO CHIKA TETSUDO K.K. (Tokyo Under-Ground Railway Co., Ltd.).—The construction of under-ground railway between Ueno and Manseibashi of the Tokyo Chika Tetsudo K.K. has been completed and will be opened by the end of January. The company is now planning to extend the line from Manseibashi to Kanda, and in order to demand for new capitalization. According to the current report the directors have decided to double its capital to the extent of Y.40,000,000.

MADRAS ELECTRIFICATION.—The English Electric Company, Ltd., which has a Branch Office in Ipoh, has received an important contract from The South Indian Railway Company for the rolling stock required for the electrification of the Madras Suburban Services. The order comprises 17 three coach articulated units, each unit consisting of three all-steel coaches, together with the necessary electrical equipment. In addition, there are four electric goods locomotives. The total value of the contract amounts to £170,000.

"SENTINEL" CARS FOR CHOSEN RAILWAYS.—Mr. Iwasaki, Chief of the Mechanical Section of the Chosen Railway Bureau, says that one of the two Sentinel cars under construction at the Ryuzan shops, will be put on the Seoul-Jinsen Line on December 1. The steam pressure of its engine was 21.1 kilogrammes per square centimetre as compared with the 14 kilogrammes of locomotives of larger type and was capable of developing a speed of 55 miles an hour with sixty-four passengers on board.

DIESEL LOCOS FOR S.M.R.—The S.M.R. has ordered two Diesel electric locomotives, one from Sulzer and the other from M.A.N. of 700 h.p. and 750 h.p. respectively at a cost of about Y.400,000. Mr. Kobayashi of the Engineering Office and Mr. Takahashi of the Shakako Railway Workshops, have been sent by the S.M.R. to Europe.

The two locomotives it is expected will be completed and tested in Europe about August, 1930, being due at Dairen about the middle of October, where they be used in the Dairen yards and for shunting purposes.

CHOSEN RAILWAY EXTENSION.—It is reported that the Chosen Railway Company has recently made arrangements to extend its line from Kaishu to Tojo on the Kokai line, 47 miles in length, at an estimated cost of about Y.375,000. Work will be started early in Spring.

NEW SIBERIAN RAILWAYS.—Work on the five-year program for the development of the transport system of the Soviet Far East will commence from December 1.

It is expected that as a result of these plans the railway net revenue of the Ussuri and Zabaikal railways will be much increased. Several railways will be built in Saghalien and one will be constructed from Habarovsk to Sovetsakaya Gavan.

In Vladivostok, Amur and Habarovsk regions, there will be built many railway branches to the sea in order to increase the number of the fishery stations on the coast and to facilitate the connection of these stations with the main trunk-railways of the Soviet Far East.

NEW CHINESE LINES IN MANCHURIA.—The new Chinese railway schemes shelved by the Soviet-Chinese difficulty, are said to have been revived by the authorities.

As to the Tsitsihar-Koshan line; for which a public loan is being floated, the rails have been laid up to Koshan, and the line will be opened to traffic by January next.

As regards the Ssufangtai-Wangkuei branch line to the Hulan-Hailun line, the Hulan-Hailun line people are carrying on the surveys on a concrete plan mapped out there-by, and work will be started on the return of spring.

The Kirin-Tungkiang line *via* Wuchang, Imienpo, Sansing, and Fuchin, over 2,000 Chinese "li" in length, work will be commenced in the autumn next year.

The plans for other lines such as one between Payen and Holikang along the Sungari in Heilungkiang Province, the Anda-Paichuan line, and the Taonan-Solun line are also being pushed forward.

PUBLIC WORKS

NEW KANCHINGTZU COAL PIER.—The construction of the new Coal Pier at Kanchingtzu (across the Bay), has been finished within 10 per cent. of completion. It will be opened to service from May next, as planned. The new 3-storeyed building in reinforced concrete for joint use by the Kanchingtzu Coal Pier Office, the International Express Co., various shipping firms, the Marine Office, the Marine Police, and the signalling station is also nearing completion.

JAPAN'S LONGEST TUNNEL READY.—The construction of Shimidzu Tunnel which is being constructed between the high passes of Gunma Prefecture and Niigata Prefecture to connect practically Outer Japan and Inner Japan was completed on December 29.

Shimidzu Tunnel is claimed to be the longest one in the East, ranking the sixth in the world. The whole length of the tunnel is 6.1 miles and the tunnel is situated at the height of 6,000 feet above sea level. The total cost for the construction of the tunnel amounted to Y.5,200,000 at the rate of Y.320 per foot.

RECONSTRUCTION OF HULUTAO HARBOR.—The Mukden Government plans to start the reconstruction of Hulutao Harbor, sometimes called Lienshan Bay, southeast of Shanhaikwan on the Peiping-Mukden Line, as soon as the weather permits.

Necessary funds are to be defrayed out of the earnings of the Peiping-Mukden Line.

About the same time, the port facilities of Newchwang will also be improved with a view to making it an outlet produce stocks carried south *via* the Paiyintala-Tahushan Line.

F. M. S. RIVER IMPROVEMENT SCHEME.—The F. M. S. Government's scheme for flood mitigation at Ipoh is almost ready to be put into operation. A flotilla of three dredges has been constructed. The largest dipper dredge, capable of treating one cubic yard a minute, is at work dredging to a depth of from six to 10 feet. The dredge draught is 2-ft. 8-ins.

As soon as the hydraulic department has taken over from the erectors the dredges will work down at Sungei Pari till the Kinta River is reached and will then work on the Kinta River in the direction of Ipoh.

The dredges will be continually employed in the maintenance, and improvement of rivers draining Ipoh.

OSAKA SUBWAY CONSTRUCTION.—Osaka received on December 28, a license permitting the issue of a loan to the amount of Y.6,660,000 with which to start the construction of the much talked-about rapid transit system within and around the city.

It was announced that the awarding of a contract to builders will be taken immediately so that the actual work be started by the end of January at the latest. He announced that the line along the Mido-suji highway of the No. 1 route will be built to begin with.

The system, which consists of four lines of both elevated and underground railways, when completed, will unite the many interurban electric railways that radiate from Osaka in all directions, reaching Kyoto in the north, Nara and Wakayama in the south, and Kobe in the west.

When all four lines are combined, the total mileage of this system will extend 33.86 miles. The work will start with only about 0.9 mile at five different places mainly on Line No.1 however.

(Detail of this plan appear in an article in the December issue of the "Far Eastern Review.")

NEW BRIDGES FOR CANTON.—Canton is to have a suspension bridge from the Bund at the end of Wei Sun Maloo across the Pearl River to Honam Island. The contract for its construction was signed between the Canton Municipality and Messrs. Andersen, Meyer and Co. on October 12, at a cost of $1,035,000 of which bargain money of $50,000 has already been paid by the City.

The bridge is to be completed within 21 months from date of contract, the work to start within one month thereof. The company has already shipped to Canton from Tientsin and Shanghai over ten tons of equipment, machinery and materials, and it is stipulated that the company is to supply all the steel work and machinery, while Messrs. McDonell and Gorman, American engineers, attend to the engineering part of the work.

The design of the bridge follows American standards and the structure carries a guarantee of 30 years from the company.

The length of the bridge is to be about 600-ft. consisting of two approach spans, each being 220-ft. long, and Scherzer Rolling Lift spans comprised of leaves 160-ft. long.

The width of the bridge is to be 60-ft. with a roadway in the centre of 40-ft. while there will be a clear footpath on each side of 10-ft. wide of which a space of 5-ft. is for pedestrians and 5-ft. for ricshas.

The weight of structural steel for the bridge will be 1,700 tons, and cast iron and re-enforced steel 85 tons. Work has already started on the Bund and Honam side.

It is also reported that arrangements have been completed for the construction of three steel bridges spanning the Pearl River and connecting the city of Canton with Honan island. It is announced by the provincial reconstruction department that work will be started on December 1. The bridges are expected to be completed in the following winter. To meet the necessary expenses for carrying out various projects of the River Conservancy Board for Kwangtung, the Central Government has ordered that appropriations be remitted to the board from the national revenue collected in Kwangtung by the Department of Finance.

SHIPPING AND SHIPBUILDING

O.S.K.'s SYDNEY MARU CREATES RECORD.—The O.S.K.'s new Diesel freighter, *Sydney Maru*, 5,435 gross tons, which left Kobe for Australia on her maiden voyage at 9 a.m., December 7, arrived in Brisbane at 7 a.m., December 26, via Moji, Hongkong and Manila, the time for the voyage being 18 days and 21 hours, according to a telegram just received from Brisbane. This is 24 hours less than expected, reducing the former schedule time by six days. This is considered a remarkable record in the Australian service of the Company's cargo boats. The *Sydney Maru's* highest speed registered at the time of the trial run was 16,136 knots per hour.

TATSUTA MARU'S TRIAL RUN.—The *Tatsuta Maru*, sister ship of the *Asama Maru*, of the N. Y. K. Line, was given her official trial run on December 27 and developed a speed of 21.232 knots per hour, easily averaging 20.930 knots per hour. The contract speed of the vessel is stated to be 19.5 knots. The big new liner is reported to have behaved splendidly and to the satisfaction of all concerned.

On the trial run the builders and high officials of the N. Y. K. were aboard and expressed themselves as highly-pleased over the vessel. The liner, as is the *Asama Maru*, is equipped with four Sulzer Diesel engines capable of developing 1,600 s. h. p. Her cabins and public rooms, it was announced, will be substantially the same as the crack *Asama Maru*, except that the decoration scheme will strike an entirely new note.

The *Tatsuta Maru* is due to sail on her maiden trip from Shanghai on April 18.

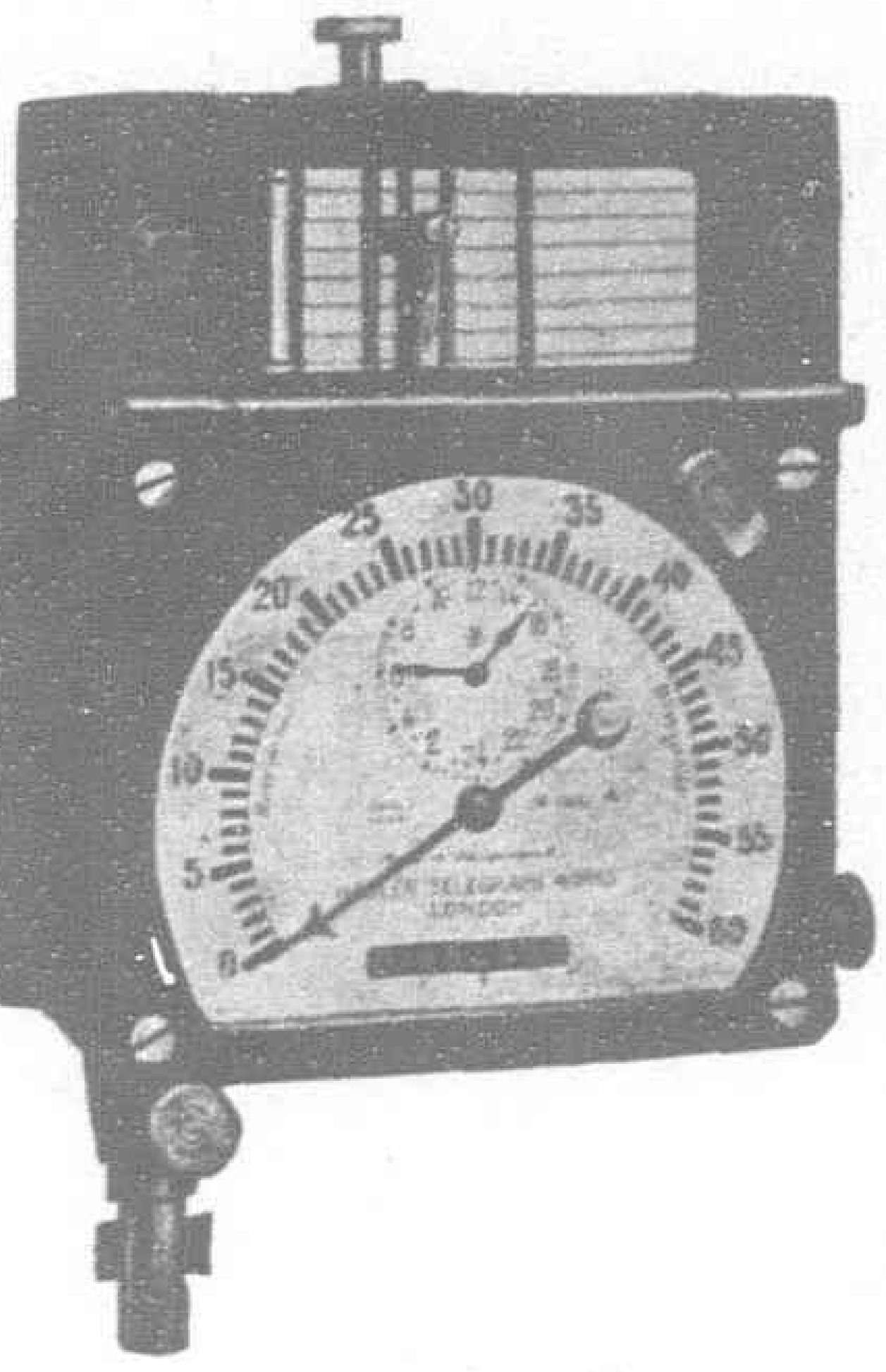
SIAMESE GUNBOAT.—The Siamese gunboat *Sukhodaya*, which has been specially designed for river estuary, and coastline patrol service, was launched from Messrs. Vickers Armstrongs' naval construction works at Barrow on November 19. Mme. Nunkae Bahiddha, wife of the First Secretary to the Siamese Legation in London, performed the launching ceremony. The British Admiralty were represented by Captain A. Maitland-Dougall, of H.M.S. *Resource*. Commander C. W. Craven, managing director of the Barrow and Newcastle works, represented the builders, and Sir Archibald C. Ross the builders of the engines, Messrs. R. and W. Hawthorn Leslie, of Newcastle.

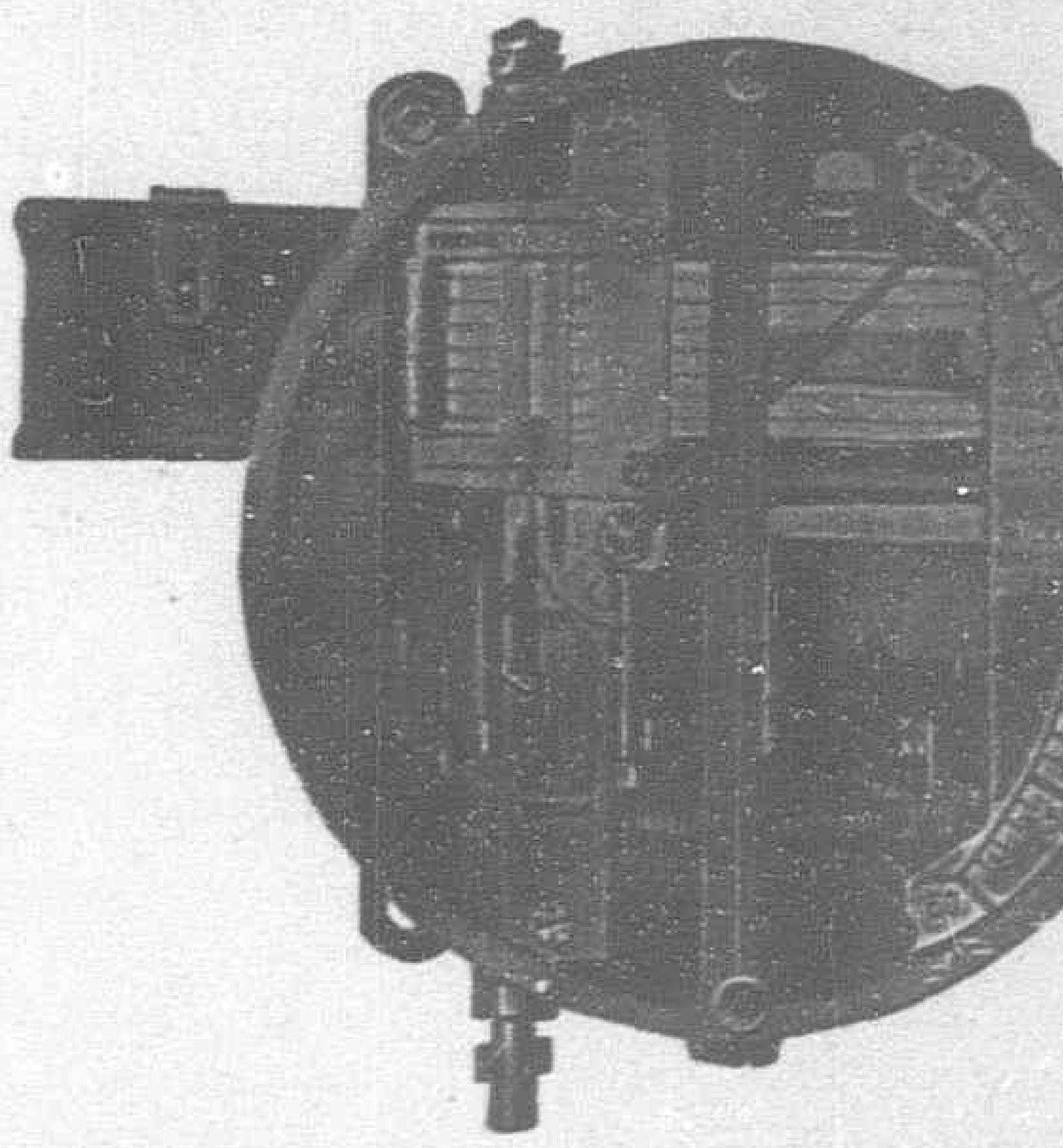
The *Sukhodaya* is a steel twin-screw ship with a length of 173-ft., and is similar to one built on the Tyne by Messrs. Armstrong Whitworth. She has armor belt of nickel steel fitted for her full length, with armor bulk-heads and screens. The upper deck is plated with heavy steel to afford protection against aerial attack. She will carry two 6-in. guns and four 3-in. high-angle guns with the latest system of fire control. Ammunition will be carried to the guns by electrical power. The main propelling machinery consists of two sets of inverted triple-expansion engines capable of developing 850 horse power, steam being supplied by two water tube boilers.

ENGINES OF EMPRESS OF CANADA.—Striking improvements in steamship propulsion will be observed in the new Canadian Pacific liner *Empress of Japan*, which is to be launched in April.

The *Empress of Japan*, which will be the largest commercial ship of the Pacific, and which is expected to cut the run between Vancouver and Japan to nine days, will be propelled by two sets of three casing Parson's type turbines of the latest design. Instead of using super-heated steam at a pressure of 215 pounds per square inch, the new ship will be fitted with Yarrow water-tube boilers and integral super-heaters, the steam pressure being 375 pounds and the temperature 700 degrees F.

The power of the new installation will be 30,000 s.h.p., and it is anticipated that the consumption rate will be as low as .60 of a pound per s.h.p. per hour for all purposes.





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Distance covered.
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HASLER TYPE

Chart Feed on a Time Basis of 4 m/m per Minute.

INDICATES:—Speed.
RECORDS BY NEEDLE PUNCTURES:—Speed attained at any point of the run.
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Duration and point of stops.
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This figure represents a saving in fuel rate, as compared with the present performance of the *Empress of Canada*, of 14 per cent. while the high-pressure turbines and water-tube boilers will occupy about 15 per cent. less space than the new machinery of the older vessel and will be some 12 per cent. lighter.

TELEPHONE, TELEGRAPH AND RADIO

SHANGHAI-HANGCHOW LONG DISTANCE 'PHONE.—It is announced that by arrangement between the Ministry of Communications and the Chekiang Provincial Government, work for the installation of a Shanghai-Hangchow long distance telephone service will be started in the near future. The proposed line will traverse the same route as that of the Telegraph Administration and for reasons of economy the telegraph poles of the Telegraph Administration will be utilized. It is expected that the new telephone service will be in operation in the spring of next year.—*Kuo Min.*

NEW AUTOMATIC SYSTEM AT HONGKONG.—February, 1930, will see a complete change in the telephone exchange system of Hongkong. Then the automatics will supersede the present system.

The work on the new system is progressing rapidly and preliminary tests have proved very satisfactory.

SHANGHAI TELEPHONE CO.'S FINANCES.—It was learned that, following the report made on the Shanghai Mutual Telephone Co. by the British expert, Mr. B. O. Anson, the question of raising the required Tls. 8,000,000 has been put before three of the leading telephone equipment manufacturers.

Officials of the Company decline to discuss the matter on the plea that a general letter to the stockholders has been drafted and will be sent out shortly.

Meanwhile it has been learned that in making overtures to the equipment companies, the Telephone Company's officials do not make any suggestions as to how they shall enter the scheme of things, whether they would consider lending the required money, or buying the Company outright, but merely ask if the manufacturers wish to take any action on the needed financing as suggested in the report.

The replies, or tenders, are to be in the hands of the company by January 6 and it is probable that some time will elapse after that before the general public has an inkling of what might become of the Company as the matter will have to be passed at a shareholders meeting.

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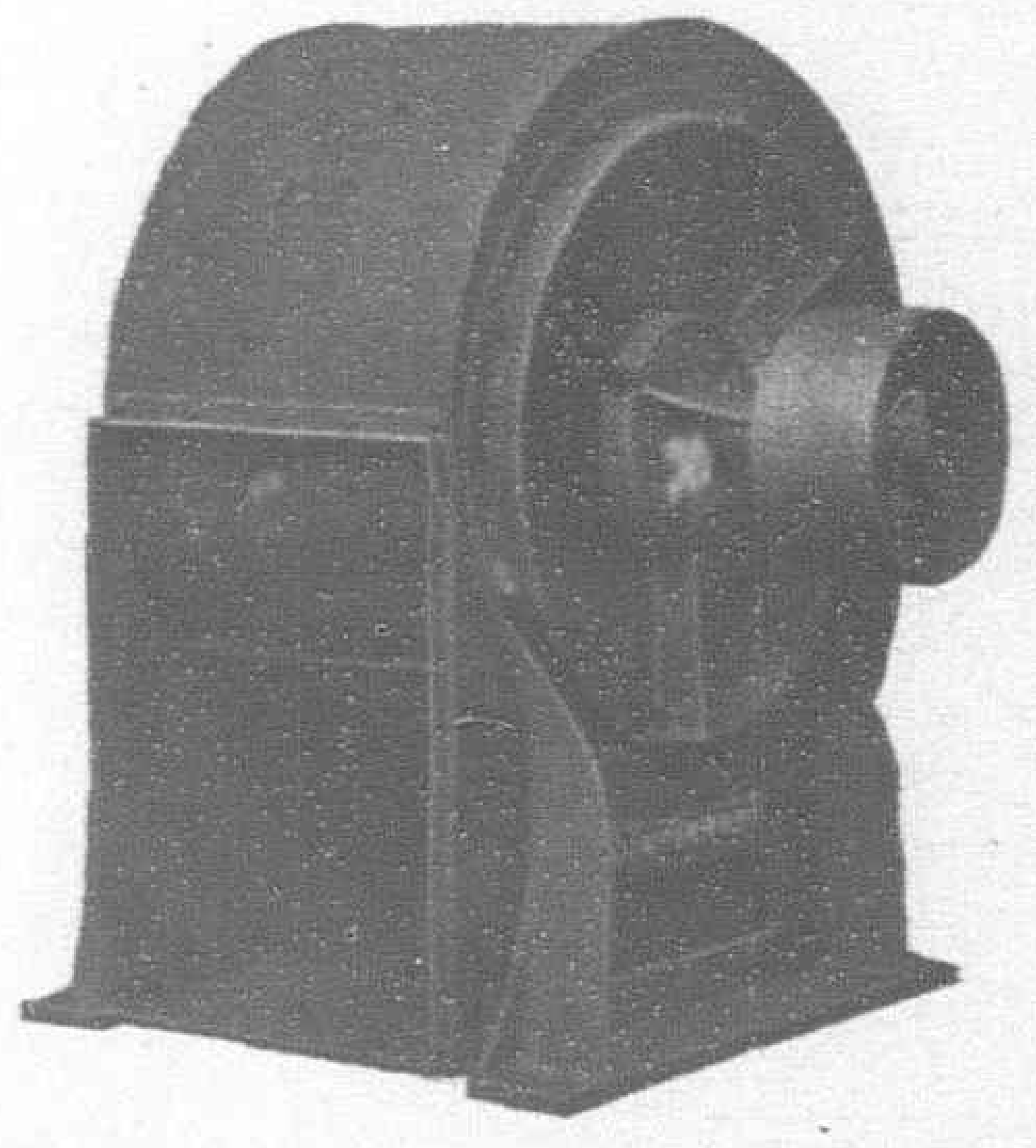

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NANKING RADIO STATION.—The central radio station at Nanking will soon be equipped with a more powerful transmitter of fifty kilowatts, according to an announcement issued by the Central Party headquarters. The new apparatus will be able to broadcast to audiences as far as Malaya, Siberia and the Hawaiian Islands.—*Kuo Min.*

TELEPHONE TO LINK 27 CITIES IN CHEKIANG.—Twenty-seven important cities and a number of districts in the province of Chekiang will be connected by telephone so as to facilitate intelligence service in the province, according to the program for the installation of a provincial long distance telephone service now being carried out by the provincial long-distance telephone bureau. The project which was started last May provides for the installation of five main lines in the province with Hangchow as the center. Eighteen of the cities have already been connected. Branch lines will also be installed later on to include the villages when the service shall have been in operation in the various districts of the province.

EXTENSIVE PHONE SERVICE FOR SHANGHAI.—Plans for a modern and extensive telephone service for the Shanghai District will shortly be submitted to the Provincial Bureau of Public Construction.

The existing service extends only from Minghong to Peichiao, but the new project will cover the territory on both sides of the Whangpoo.

On the Shanghai side of the Whangpoo, the plan calls for a line connecting Peichiao and Weichiao, another between Peichiao and Tangwan and a third and the longest one between Minghong and Changchiao. The last mentioned one will run along the Whangpoo and pass through Tutsuchok.

On the Pootung side, a line will connect Yangszechen and Chiao-touchen and another crossing it will link East Sandling, and West Sanling.

A main cable will then be laid across the river connecting the two systems.

MOTOR CARS

GENERAL MOTORS IN SINGAPORE.—the Far Eastern headquarters of the General Motors Export Company are to be transferred to Singapore from Bombay.

This announcement was made by Mr. H. V. Phillips, the Company's regional director for the Far East.

The Far Eastern region of the General Motors Export Company includes N. V. General Motors Java (which serves the Dutch East Indies, French Indo-China, Borneo, Straits Settlements, Malay States, Siam, and Dutch New Guiana), General Motors Japan Ltd. (which sells cars, trucks and buses in Japan, Korea, China, Siberia, Formosa and Manchuria), and General Motors India, Ltd. (which serves British India, Ceylon and East Persia.)

OKURA INTERESTS PURCHASING MOTOR BUS LINES.—The Okura interests are concentrating their efforts on buying up many important bus lines in preparation for their inauguration of a big automotive vehicle manufacturing enterprise within a few years. At the present time about 200 miles of such bus routes, mainly serving the large metropolis surburban districts are under investigation with the ultimate view of being annexed to these interests.

Preference will be given, to motor lines in central Kanto and Kansai sections, over the provinces in Tohoku and Hokurku regions where motor traffic during winter months is very often interrupted on account of weather conditions. The Okura Gumi at present maintains motor bus lines in Nikko, Izu and Iyo, but each under separate and independent managements. It is believed that new acquisitions will be operated along the same principles.

The Japan Motor Company, an Okura affiliation, now finds its two body-building plants located in the Tokyo suburbs inadequate to take care of the potential body needs of the Okura system, and a third plant is being contemplated in Kawasaki for which a site has already been purchased.

AVIATION

FIRST CHINESE-MADE MILITARY PLANE.—The first military aeroplane made in China has been completed by the Airplane Manufactory in Fukien. The new plane is equipped with two machine-guns and one small gun. It has been named the "Haitiao" and is shortly coming to Nanking on its maiden flight.

AIRPLANES LINKING TOKIO AND DAIREN.—Plans are being rushed for the opening of the projected air line, using American planes, between Tokio and Dairen and the first machine is expected to take passengers over the route by April 1. If the present plans are carried out it will be the most extensive passenger air service in the Far East. There will be three stops between Tokio and Dairen, the first at Osaka, 300 miles from Tokio; the second at Fukuoka, 300 more miles south of Osaka, and another at Seoul, about 350 miles farther. From Seoul to Dairen is 325 miles. It is estimated that the total time from Tokio to Dairen will be 13 hours and 50 minutes.

AIR MAIL SERVICE BETWEEN GERMANY AND CHINA.—Negotiations between the China Aviation Corporation and the Luft Hansa of Germany, which have been under way for several months are nearing completion and an agreement is expected to be signed shortly. The agreement, so far as can be ascertained, provides for an air mail and passenger service between China and Germany via Siberia. The German company will supply machines but they are to be considered as the property of the Chinese corporation. Representing the Luft Hansa is Mr. Schmidt, while the Chinese company is represented by the Ministry of Communications. The contract also stipulates that passengers on arrival in Berlin may take any of the air ways of the German company for travelling purposes. Another feature of the agreement is the provision that in case of differences over interpretation the Chinese version should be regarded as authoritative.

ROADS

A project to construct five main highways in Shantung, connecting various important cities of the province, has been drafted by Mr. Kung Fan-wei, Provincial Commissioner of Reconstruction. The proposed scheme provides for the building of the Litsinghsien-Tsinan, Tsaochow-Tsinan, Tehchow-Lincheng, Wehsien-Taierhchwang and Ichowfu-Haichow (Kiangsu) motor roads within the shortest time possible.

Work on the Weihsien-Taierhchwang and the Ichowfu-Haichow roads is to be started first, as their early completion will greatly facilitate communication in southern Shantung and northern Kiangsu. The total cost of construction of the two roads is estimated at $1,850,000.—*Kuo Min.*

BUILDINGS

PENANG BUILDING SCHEMES :—Sums totalling $207,188 are to be spent in the near future by Government on various buildings in Penang.

SINGAPORE'S NEW BUILDING :—The K.P.M. (the Royal Packet Navigation Company of Batavia) will erect an office building, six stories high, constructed entirely of reinforced concrete, the exterior of the building being in masonry similar to that of the new Mercantile Bank.

A section of the basement will be set aside for an underground garage, entrance being effected by means of an inclined drive.

Three lifts will be installed.

The height of the building will be 95 feet 6 inches.

The building is expected to be ready about the end of next year, and will cost considerably over $500,000. The architects are Messrs. Keys and Dowdeswell.

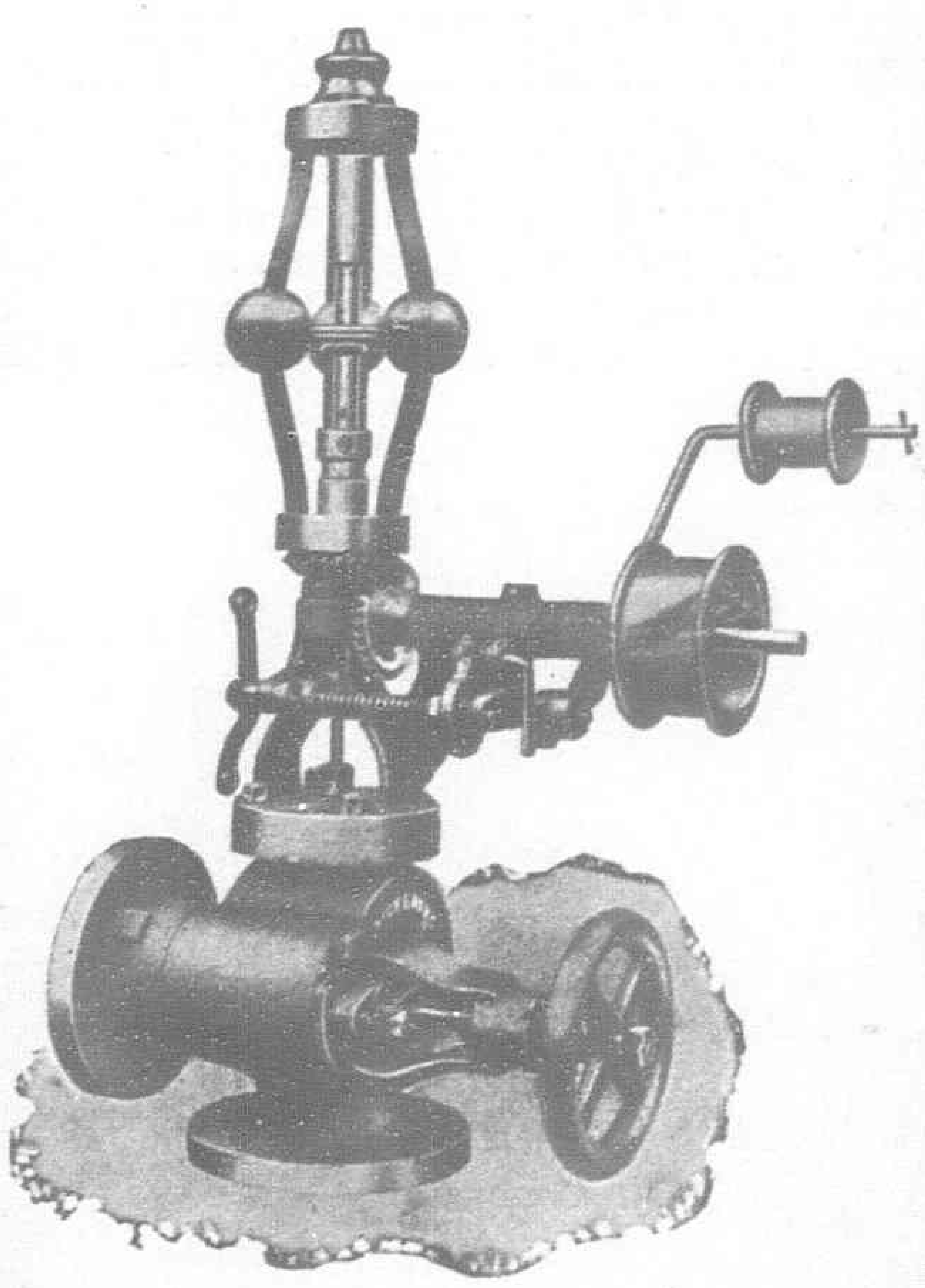
NEW BANK VAULT :—The Central Bank of China has purchased the land adjoining the south side of the Central Bank on the Bund at the corner of Kiukiang Road. for the purpose of erecting a new vault building for the Central Bank because of the inadequacy of present vault space.

The new building will be provided with every modern appliance, both for the protection of the reserves and the rapid and accurate counting of the specie reserve.

MINING

MALAYAN TIN MINING.—The Malayan Government, after considering the rate of the depletion of the potential tin resources of the F.M.S., have decided, except in special cases, that no application for mining land or conversion of agricultural to mining title outside the existing mining areas will be considered, and within such areas alienation or conversion will not be approved unless for the efficient development of the existing undertakings.

PICKERING TYPE GOVERNORS



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